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AIR POLLUTION ABSTRACTS

54116-54660

FEBRUARY 1976

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Office of Air Quality Planning and Standards
Research Triangle Park, N. C. 27711

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 54116 - 54660.

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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APTIC Publications

Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:126, $0.65.

Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts, June 1973 GPO No. EP 4.9:125, $0.70.

Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts, March 1973, GPO No. EP 4.9:121, $2.35.

Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:119, $0.90.

Mercury and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, $1.25.

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Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:95, $0.50.

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Radian Corporation, 8500 Shoal Creek Blvd., Austin, Texas 78766

Contract No. 68-02-2279, RFP No. Du-75-B189 .... *$383,596*

A STUDY TO EXAMINE THE BIOCHEMICAL ACTION OF NO2 AND SO2 ON LUNG METABOLISM AND DEVELOP ALTERATIONS THAT OCCUR INTO A DOSE RESPONSE BIO-INDICATOR.

Southwest Foundation for Research and Education, P. O. Box 28147, San Antonio,Texas 78284

Contract No. 68-02-2293, RFP No. Du-76-B094 .... *$33,220*

PURCHASE OF AN INFRARED MICROSCANNER AND A LEAD-TIN-TELLURIDE DETECTOR.

Barnes Engineering Company, 30 Commerce Road, Stamford, Connecticut 06904

Contract No. 68-02-1387, Task Order No. 5 .... *$30,000*

DISPERSION MODELING OF 24-HOUR LOW GROUND LEVEL ARSENIC CONCENTRATIONS.

H. E. Cramer Company, P. O. Box 9249, Salt Lake City, Utah 94109

Contract No. 68-02-2349, RFP No. Du-75-C406 .... *$36,270*

AIR QUALITY MAINTENANCE ANALYSIS FOR CARBON MONOXIDE AND PHOTOCHEMICAL OXIDANT (PHOENIS).

Aerovironment, Inc., 145 Vista Avenue, Pasadena, California 91107

Contract No. 68-02-2280, RFP No. Du-75-B228 .... *$699,982*

ASSESSMENT OF THE POSTNATAL DEVELOPMENT AND FUNCTION OF THE CENTRAL NERVOUS SYSTEM OF MONKEYS EXPOSED TO TRITIATED WATER, FROM CONCEPTION TO BIRTH OR WEANING.

Stanford Research Institute, Menlo Park, California 94025

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Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-2142, RFP No. Du-75-A301 .... *$834,642*
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Westinghouse Electric Corporation, Research Laboratories, Beulah Road, Pittsburgh, Pennsylvania 15235

Contract No. 68-02-1380, Task Order No. 15 .... *$42,650*
TO REVIEW, COLLECT, AND UPDATE AN EMISSIONS INVENTORY IN SUPPORT OF AQMP DEVELOPMENT (NEW MEXICO).
Engineering Science, Inc., 150 North Santa Anita Avenue, Arcadia, California 91006

Contract No. 68-02-1376, RFP No. Du-76-C165 .... *$35,000*
TEST AND EVALUATION IMPROVEMENTS TO SINGLE SOURCE MODEL.
GCA Technology Division, Burlington Blvd., Bedford, Massachusetts 01730

Contract No. 68-02-2352, RFP No. Du-76-C161 .... *$20,000*
ANALYSIS OF PHOTOCHEMICAL OXIDANT PRECURSOR, AND METEOROLOGICAL DATA FROM THE SUMMER 1975 NORTHEAST OXIDANT TRANSPORT FIELD STUDY.
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Radian Corporation, P. O. Box 9948, Austin, Texas 78766

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IMPROVED METHODS FOR IDENTIFYING AND EVALUATING LOCALIZED VIOLATIONS OF CO AMBIENT AIR STANDARDS.
GCA/Technology Division, Burlington Road, Bedford, Massachusetts 01730

Contract No. 68-02-2350, RFP No. Du-76-C014 .... *$92,240*
THE ENVIRONMENTAL PROTECTION AGENCY IS SEEKING A CONTRACTOR WITH EXPERTISE IN THE NATURAL SCIENCES, RECREATION AND OPEN SPACE PLANNING, AIR RESOURCE MANAGEMENT, STATISTICAL ANALYSIS OF DATA, AND COST-EFFECTIVENESS ANALYSIS OF PUBLIC INVESTMENT DECISION-MAKING.
COMSIS Environmental Services, 972 New London Turnpike, Glastonburg, Connecticut 06033

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1975

54116 **APTIC NO. 78874**

Aiba, Tetsuro

INVESTIGATIONS ON THE CONTROL OF EMISSIONS FROM AIRCRAFT GAS TURBINE COMBUSTORS (II) - CALCULATION OF THE EQUILIBRIUM AND NO CONCENTRATIONS IN COMBUSTION GASES. *(Kokuyo gasu tabin nenshoki ni okeru haiki seigyo no kenkyu (II) - Nensho gasu no kagaku heiko keisan to NO nodo no keisan). Text in Japanese. Koku Uchu Gijutsu Kenkyusho Shiryo (Tech. Mem. Natl. Aerosp. Lab.), vol. 273, 262p., Jan. 1975.*

The concentrations of 16 chemically equilibrated compositions including carbon dioxide, water vapor, oxygen, nitrogen, carbon monoxide, hydrogen, atomic oxygen, hydroxyls, atomic hydrogen, nitric oxide, atomic nitrogen, nitrogen dioxide, dinitrogen oxide, ammonia, argon and methane in the aircraft gas turbine engine combustion gases given by the fuel CnH2n and air were calculated. The calculations were carried out at wide ranges of equivalent ratio from 0.25 to 3.0, pressure from 1 atm to 50 atm and temperature from 900 K to 4000 K. A known method was employed for the equilibrium calculation. Adiabatic flame temperatures of the gases were calculated based on the equilibrium calculation and equations for energy balance. The concentration of nitric oxide was calculated based on its reaction rates. Effects of several factors, such as temperature, equivalent ratio and operating conditions of a simplified combustor model, on the concentration were shown by the calculation.

54117 **APTIC NO. 78750**

Avery, G. L., G. E. Merva, and J. B. Gerrish

HYDROGEN SULFIDE PRODUCTION IN SWINE CONFINEMENT UNITS. *Trans. ASAE (Am. Soc. Agr. Engrs.), 18(1):149-151, Jan.-Feb. 1975. 7 refs.*

The rate of production of hydrogen sulfide in swine confinement units was investigated. Production of H2S is highly correlated with the average outside air temperature, the ratio of pit area to building volume, the air retention time for the building, and the daily sulfur intake. There is no significant difference of H2S content between samples taken at different times of the day, but there is significant difference of the H2S content between samples taken on different days. The cadmium hydroxide-methylene blue method is a very effective procedure for trapping and testing for H2S in swine confinement units. (Author conclusions modified)

54118 **APTIC NO. 78748**

Blazowski, W. S., D. E. Walsh, and K. D. Mach

OPERATING AND AMBIENT CONDITION INFLUENCES ON AIRCRAFT GAS TURBINE NOX EMISSIONS. *J. Aircraft, 12(2):110-115, Feb. 1975. 12 refs. (Presented at the American Institute of Aeronautics and Astronautics/Society of Automotive Engineers Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, Paper 73-1275.)*

A relatively simple model is used to predict aircraft turbine engine nitrogen oxide emissions. Prompt nitric oxide and the predominant NO formation and destruction reactions are considered in the analysis. Key assumptions include constant NO formation time, primary zone equivalence ratio of 0.9 and equilibrium concentrations of nitrogen molecule, nitrogen atom, and oxygen atom. Correction factors for ambient humidity and temperature are derived from the model to correct data obtained at given ambient conditions to standard dry conditions, 288 K and zero gm water/gm dry air humidity. Mach number strongly influences NOx emission due to the ram effect on temperature and pressure. Altitude reduces NOx emission because of reduced ambient pressure and temperature. The ideal effectiveness of combustor water injection for NOx abatement is evaluated. (Author summary modified)

54119 **APTIC NO. 78979**

Bridbord, Kenneth, Paul E. Brubaker, Bruce Gay, Jr., and Jean G. French

EXPOSURE TO HALOGENATED HYDROCARBONS IN THE INDOOR ENVIRONMENT. *Environ. Health Perspect., vol. 11:215-220, June 1975. 9 refs.*

Instances where halogenated hydrocarbons in indoor air environments may build up to concentrations of potential public health concern are reviewed. Freon in aerosol propellants, perchloroethylene in spot removers, volatile compounds in solvents, and halogenated hydrocarbons used as anesthetic agents are considered. Indoor levels of halogenated hydrocarbons are frequently greater than are found outdoors, though indoor contamination may frequently originate from outdoor sources. Many halogenated hydrocarbons are suspected as potential health risks for the general population, due to their inherent toxicity, the range of concentrations which may be present in the air, and the probability that members of the population may be exposed to these concentrations.

54120 **APTIC NO. 78935**

Bunch, R. L.

BIOLOGICAL FILTERS. *Journal Water Pollution Control Federation, 47(6):1258-1261, June 1975. 24 refs.*

Aerosol pollution of the atmosphere by trickling filters is described. When air travels over an operating trickling bed filter, its bacterial content is signficantly increased. The majority of particles emitted are less than 5.0 micron in diameter and have a good change of being deposited in the human lung.

54121 **APTIC NO. 78688**

Bundy, D. S. and T. E. Hazen

DUST LEVELS IN SWINE CONFINEMENT SYSTEMS ASSOCIATED WITH DIFFERENT FEEDING METHODS. *Trans. ASAE (Am. Soc. Agr. Engrs.), 18(1):137-139, Jan.-Feb. 1975. 11 refs.*

Dust levels were monitored in the air surrounding swine buildings and in two 24-hour animal test chambers with and without growing pigs. Animal activity and dust levels are higher when self-feeders are used than when animals are fed twice daily. The dust level is lower for floor feeding of pellets than for ground feed fed on a concrete floor. There is no significant difference in dust levels for pellets and ground feed in self-feeders. Air ventilation at 35 cfm per animal reduces the

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dust level to 50% of that with no ventilation. Ninety-five percent of the dust in the atmosphere of swine buildings is in particle sizes considered damaging to the lungs of animal and humans. (Author summary modified)

54122 **APTIC NO. 78416**

Choi, Paul, Norbert Dee, and Howard Reiquam

INTERDEPENDENCE OF AIR, WATER, AND SOIL POLLUTION CONTROL STRATEGIES IN A POWER PLANT AND A KRAFT MILL. *Water, Air, Soil Pollut., 4(3/4):381-394, July/Aug. 1975. 10 refs.*

An analysis of cross-media (air, water, and soil) emissions resulting from seven control strategies for a coal fired power plant and 10 control strategies for a kraft pulp and paper mill is presented. The pollutant parameters include nitrogen oxides, sulfur dioxide, particulates, heat, suspended solids, sludge, ash from coal burning power plants. Particulate total reduced sulfur compounds (TRS) Biological Oxygen Demand, dissolved solids, suspended solids, color, ash, and sludge from kraft pulp mills. Uncontrolled and controlled emissions to all three environmental media are discussed as well as power requirement and capital and operating costs. Control strategies are evaluated based on controls for all three media. Environmental impacts for unit pollutant emission vary depending on the type of pollutant. (Author abstract modified)

54123 **APTIC NO. 78971**

Daisho, Yasuhiro and Takeshi Saito

ON THE NO FORMATION OF DIRECT INJECTION TYPE DIESEL ENGINE: SAMPLING EXPERIMENT OF GASES IN COMBUSTION CHAMBER. *(Chokusetsu funsha diizeru kikan no NO seisei ni tsuite: Dai 3 po, Nenshoshitsunai gasu no sanpuringu jikken). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 483-492, 1975. 9 refs. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

The formation mechanism of nitric oxide in a direct injection diesel engine was investigated by analyzing combustion gas sampled directly from the combustion chamber of a four cycle single cylinder engine. The NO concentration was measured by varying the injection timing and injection rate. The NO concentration was lower in the center region of fuel spray with high combustion gas concentration, higher in 30 deg atdc region, and also lower in the outer region with low combustion gas concentration. The dispersion of sprayed fuel is hampered by injection timing retardation, and the air ratio is reduced, which results in the reduction of NO formation. With an increase in injection rate, the region with high combustion gas concentration is increased; however, the NO concentration per unit of fuel is decreased. With variation in spray nozzle size and swirling, the high and low combustion gas concentration regions varied, which indicated the effect on NO in exhaust gas. The NO level in exhaust gas can be explained by a NO calculation model based on the distribution of an excessive oxygen ratio in combustion, taking into consideration the high and low combustion gas concentration regions.

54124 **APTIC NO. 78513**

Daley, Peter S.

A REVIEW OF USAF AEROSOL RESEARCH: AEROSOL GENERATION IN ELECTROPLATING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 2 refs. (Presented at the Air Pollution Control Association Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-32.8.)*

Air Force aerosol research projects are reviewed including turbine engine emission measurement, ambient sampling, and optical aerosol interactions. A project directed toward development of an emission factor to predict aerosol generation from electroplating operations is specifically discussed. Metal ion aerosol generation from the surface of silver, nickel, and cadmium electroplating operations is insignificant. Aerosol generation in chromium electroplating is 0.12 g Cr/ampere-day. This value is independent of process variables other than the current applied to the plating bath. (Author abstract modified)

54125 **APTIC NO. 78622**

Deutch, Michael J.

INTERNATIONAL ENERGY IN THE GLOBAL ENVIRONMENT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 2 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-08.3.)*

The international energy situation is reviewed in terms of economic and environmental considerations. Topics discussed include: energy consumption requirements of different countries, the impact of higher energy prices, environmental impacts associated with the use of different fuels, the need for more balanced strategies and environmental trade-offs, energy policy formulation, and the parameters of air pollution abatement and prevention costs. Coal, rather than oil combustion, may well be responsible in 1980 for the bulk of sulfur emissions in the United States, whereas oil is likely to remain the mainstay of the fossil fueled energy generation activities in Europe. Imports of coal will supplement to a minor extent (6%) the overwhelming dependence on oil imports in Japan.

54126 **APTIC NO. 78498**

Farquhar, J. T.

HOW INDUSTRY MEETS THE LAW S CHALLENGE ON AIR POLLUTION. *Prevent. Pollut. - Role Ind. Conf. Proc. London, England, 1975, p. 9-14. (March 12-13, Paper 3.)*

The British industry s success in reducing air pollutant emissions is discussed. Dust emissions from coal-burning power stations in England and Wales between 1958 and 1972 decreased from 1 million tons to less than one-fifth that figure. Substantial dust emission reductions were also recorded for the cement industry and sintering operations, being approximately fourfold and threefold, respectively. The increasing use of North Sea oil and gas which are both very low in sulfur content is expected to significantly reduce sulfur dioxide and sulfuric acid air pollution. Reductions in ammonia emissions from specific industries are also being achieved.

54127 **APTIC NO. 78641**

Fischer, William G.

CASE HISTORY OF DIESEL USE: FMC CORP. GREEN RIVER TRONA MINE, WYOMING. *Bureau of Mines Information Circ., vol. 8666:77-91, 1975. (Presented at the Symposium on the Use of Diesel-powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)*

A 10-year sampling program of diesel exhaust emissions at the Green River Trona Mine is summarized. The program includes 3342 samples of undiluted exhaust, 2977 samples of carbon monoxide in the operator s position, 1504 samples of nitrogen dioxide in the operator s position, and 409 detailed samples for the purposes of defining ventilation techniques. Sulfur dioxide is not produced in sufficient quantity from no. 2 diesel fuel to warrant continued sampling. Odor and visible smoke is a good indication of aldehydes and they are used as an indicator rather than measurements. The average CO in the operator s position is 8.5 ppm/five percent of the samples are in excess of 50 ppm, the current 8-hour threshold. The mean average of NO2 samples is 0.2 ppm.

54128 **APTIC NO. 78809**

Fukushima, H., T. Ishiguro, T. Iwaski, H. Onozuka, and T. Ohira

ON THE POLLUTANTS IN THE EXHAUST GAS FROM BOILER. *(Boira haigasu chu no osenshitsu ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 6:55-62, 1975. 3 refs.*

Waste gases from four boilers of various capacities were analyzed. The heavy oil consumptions ranged from 9000 l/hr for a power-generating boiler to 70 l/hr for a heating boiler, and the total emission ranged from 136,000 N cu m/hr to 1050 N cu m/hr. Sulfur dioxide was measured by infrared, nitrogen oxides by chemiluminescence method and IR, total hydrocarbon by gas chromatography with flame ionization detector, carbon dioxide by thermal conductivity method, and oxygen was by magnetic method. Results showed that one-peak type relationship existed between the NO_x concentration and the air ratio. The NO_x concentrations adjusted to unity air ratio increased to almost constant values when the air ratio increased. The rates conversion of the nitrogen contents in A and C oils ranged from 10% to 60%. Abnormal combustion at very low air ratio resulted in the decreases of NO_x and CO_2 concentration but the increases of sulfur oxides and total hydrocarbon concentration.

54129 **APTIC NO. 78572**

Grennfelt, Peringe, Thomas Lindvall, and Bertil Wetterholt

RELATIONSHIPS BETWEEN ODOROUS EMISSIONS FROM A LIME KILN AND CERTAIN PHYSICOCHEMICAL PARAMETERS. *(Samband mellan luktemissioner fran en mesaugn och nagra fysikalisk-kemiska parametrar). Text in Swedish. Swedish Water and Air Pollution Research Lab., Goteborg, 11p., Feb. 1975. 6 refs.*

The exhaust gases from a lime kiln were analyzed in relation to various operating variables. The release of hydrogen sulfide was related to the temperature of the gas at the outlet of the oven as well as to the sodium content of the lime. Hydrogen sulfide concentration was a satisfactory indicator of exhaust gas odor strength. A positive correlation existed between the concentration of sulfur dioxide and H_2S, indicating a common formation mechanism for these gases. (Author abstract modified)

54130 **APTIC NO. 78804**

Hara, S.

TREND OF ENVIRONMENTAL POLLUTION CONTROL LAW AND ASPHALT. *(Kogai kiseiho no doko to asufaruto). Text in Japanese. Asufaruto (Asphalt), 18(101):8-13, July 1975. 7 refs.*

The trend in environmental pollution control is reviewed, with a definition of environmental pollution and environmental standards and with summary of the Pollution Control Basic Law. Asphalt is about 2% of more than 200 million kl of petroleum product consumed each year. The sulfur content in asphalt is 4-5%, which is discharged during the heating and production process. Pollution problems in the asphalt production process involving the treatment of condensed water from a steam ejector and furnace exhaust gas containing sulfur oxides and nitrogen oxides are described, with flow sheets. Pollution problems associated with the use of asphalt (maltene, petrolene, asphaltene) are discussed with regard to the malodorant composition, threshold limit, heating temperature and storage temperature. Studies on the carcinogenic effect of asphalt are also reviewed.

54131 **APTIC NO. 78512**

Hindman, Edward E., II, Peter V. Hobbs, and Lawrence F. Radke

AIRBORNE INVESTIGATIONS OF AEROSOL PARTICLES FROM A PAPER MILL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. 18 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-32.9.)*

Airborne measurements were made in the effluent of a Kraft-process paper mill and in nearby air unaffected by the mill using a new particle sampling facility which integrates the data from five instruments. The aerosol particle measurements demonstrate that the effluent from the paper mill is a significant and consistent source of particles with diameters greater than 0.08 micron. The effluent contains fewer particles smaller than 0.08 micron than nearby air, indicating that inhanced coagulation of particles may be occurring in the mill s effluent and not occurring in the nearby air. The effluent from the mill is a significant source of large and giant cloud condensation nuclei (CCN), but not a significant source of small CCN. These large and giant CCN account for the anomalously large drops which are observed in clouds located in the effluent of the paper mill investigated. (Author abstract modified)

54132 **APTIC NO. 78886**

Jaskulla, N. and W. Prietsch

SCIENTIFIC COOPERATION WITH THE SOVIET UNION ON THE PROBLEM OF CARCINOGENIC HYDROCARBONS IN THE EXHAUST GAS OF AUTOMOBILES. *(Wissenschaftskooperation mit der Sowjetunion zum Problem der kanzerogenen Kohlenwasserstoffe im Abgas von Kraftfahrzeugen). Text in German. Technik (Berlin), 30(5):330-331, 1975. 7 refs.*

Cooperation between East Germany and the USSR in the study of carcinogenic hydrocarbons, especailly 3,4-benzo(a)pyrene, in automobile exhaust gases, and preliminary results are presented. Sampling is done immediately behind the exhaust pipe by means of a filter. After thin-layer chromatographic fractionation, 3,4-benzo(a)pyrene is determined by quasilinear fluorescence spectroscopy in frozen polycrystalline solutions at 77 K. Preliminary analytical results show a beneficial effect of the limitation of the idle carbon monoxide emission to 4.5% in terms of reduced 3,4-benzo(a)pyrene emission.

54133 **APTIC NO. 78891**

Kliemann, S.

STATE OF THE ART AND POSSIBILITIES OF DEVELOPMENT IN THE DESIGN OF COOLING TOWERS WITH RESPECT TO VARIOUS ENVIRONMENTAL INFLUENCES. *(Stand und Entwicklungsmoeglichkeiten im Kuehlturmbau unter den Gesichtspunkten der verschiedenen Umwelteinfluesse). Text in German. VGB Kraftwerkstechnik, 55(6):375-381, 1975.*

The state of the art and possibilities in the design of cooling towers are outlined. New designs and current developments are characterized by increased efforts to achieve a higher degree of reliability and environmentally safe operation. While it is technically feasible to design and construct natural draft and forced-draft wet cooling towers for high block capacities up to and over 1200 MWatts, the use of dry cooling towers is presently limited to small and medium-size power plants blocks. For physical reasons, it is impossible to prevent visible vapor emissions from wet type cooling towers. Therefore, such emissions in the neighborhood of airports, highways and other locations where good visibility is important, are prevented by the use of combined wet and dry cooling towers with parallel connection of the wet and dry parts on the air side. Cooling water droplets entrained from the spray space are large enough to cause precipitation, while droplets generated by recondensation are small and thus cause no environmental problems.

54134 **APTIC NO. 78716**

Kuenstle, K.

ENVIRONMENT AND ENERGY CONVERSION IN THERMAL POWER PLANTS. *(Umwelt und Energieumwandlung in thermischen Kraftwerken). Text in German. Tech. Mitt., 68(1/2):49-55, 1975. 7 refs.*

General ecological problems of energy conversion in conventional and nuclear thermal power plants are described. While thermal power plants convert 25% of the total primary energy, they account for only 15% of the overall air pollution, which indicates that power plants are environmentally more favorable than other existing energy conversion systems. Carbon dioxide, the major by-product of the energy conversion process, may cause an overall increase in the earth's temperature. The sulfur dioxide emissions can be abated by fuel and flue gas desulfurization. It would be possible to remove 25% of the sulfur in soft coal in an economically acceptable manner, which would result in a reduction of the SO2 emissions by 15%. The reduction of the sulfur content in oil from 2% to 1% would reduce the SO2 emissions from power plants by 9%. Wet type flue gas desulfurization causes considerable problems in connection with sludge disposal. Therefore, dry methods with recovery and utilization of the by-products offer the ideal solution. It is possible to use large proportions of the power plant waste heat for remote heating and as industrial process heat.

54135 **APTIC NO. 78969**

Matsumura, I.

ENVIRONMENT. *(Kankyo). Text in Japanese. Nisseki Rebyu (Nisseki Tech. Rev.), 17(4):228-231, 1975.*

Pollution problems faced by the petroleum industry, effects of various pollution control laws, and pollution control measures taken by Nippon Sekiyu Refinery are discussed. Pollution control policies of Nippon Sekiyu include control measures for air, water, malodor, and noise pollution in the production phase, and pollution in the consumption phase such as sulfur content in fuel oil and lead in gasoline. In five refineries with a total of crude oil treatment capacity of 578,000 BPSD, the sulfur oxides, nitrogen oxides and particulates emissions are controlled in compliance with the air pollution control standards of each city, and cadmium, cyanides, lead polychlorinated biphenyl, biochemical oxygen demand, chemical oxygen demand and other waste water criteria are controlled in compliance with the water pollution control regulations. A chronological description of pollution control measures taken at Negishi Refinery since April 1960 is given.

54136 **APTIC NO. 78603**

Midkiff, William S.

COOLING TOWER MODIFICATION FOR INTERMITTENT OPERATION. *California Univ., Los Alamos, N. Mex., Los Alamos Scientific Lab., Energy Research and Development Administration Contract W-7405-ENG. 36, Rept. LA-5920-MS, 4p., April 1975.*

A redwood cooling tower for a nuclear reactor was adapted for intermittent operation of the reactor. The tower must be kept moist (to eliminate splitting of the wood) and kept from freezing. The cooling water temperature in the reactor should remain close to 40 C to reduce wear caused by expansion and contraction of the water. Lawn sprinklers were used in the summer, when freezing was not a problem, to keep the wood wet. Successful winter operation became possible when a canvas bonnet was installed to restrict air flow across the fan. Plywood shutters were installed over the louvers, which improved the thermal stability of the cooling water. An added benefit was increased humidity. With the bonnet on and the shutters closed, evaporating water would condense on the wood to keep it wet or moist. The performance of the modified cooling tower was checked by shutting off the reactor when the water reached 39 C. The circulating water continued to circulate. The basin water temperature and the circulating water temperature had reached 21.5 C in two days. Nighttime ambient temperatures dropped as low as -23 C (-10 F) during this time.

54137 **APTIC NO. 78671**

Pellifroni, Marco G.

AUTOBUS AND URBAN ECOLOGY. *(Autobus ed ecologia urbana). Text in Italian. Inquinamento, 17(1):38-40, Jan. 1975. 10 refs.*

In 1971 the city of Milan, Italy, purchased 800 new buses, and 1250 more were authorized for 1975 purchase. This bus-buying policy is incompatible with thee present and future environmental and health needs of the city. Electric vehicles (trolleys and trackless trolleys) are by far superior to the Diesel buses as regards pollution. The former do not emit exhaust gases in the streets, and the latter, if kept properly adjusted for maximum yield and low pollution, would require three times the present available maintenance facilities. A survey by the Institute of Health showed that in fact over half the buses in use did not meet legal standards. Buses cannot deliver maximum efficiency because of traffic conditions. They are not even good competition for the passenger car, since they have to operate for longer hours and must carry relatively small numbers of passengers during non-peak hours.

54138 **APTIC NO. 78625**

Rolinski, E. J., A. J. Buonicore, and L. Theodore

EVALUATING ENERGY POLICY ALTERNATIVES IN LIGHT OF ENVIRONMENTAL CONSIDERATIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 17 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-08.2.)*

Energy policy alternatives are discussed in relation to the apparent conflict between energy needs and environmental goals. Energy systems are the largest sources of pollutants emitted into the air. Fuel combustion from stationary sources in 1969 accounted for 61% of the particulates, 96% of the sulfur oxides, and 43% of the nitrogen oxides released by manmade sources in the United States. Automobiles and other forms of transportation caused over one half of the total emissions, contributing on a nationwide basis over 70% of the carbon monoxide, over 50% of the hydrocarbons, and almost 50% of the nitrogen oxides. Regarding energy policy alternatives, energy systems must be evaluated in light of their total impact on the environment. A reduction in air and water pollution is likely to lead to an increase in the amount of solid waste generated. Reducing air pollution from automobiles may well increase fuel consumption, with attendant increases in environmental damage from the extraction, transport, and refining of crude petroleum.

54139 **APTIC NO. 78667**

Suga, K., T. Watanabe, and T. Ohira

COMPOSITION OF HYDROCARBONS IN AUTOMOTIVE EXHAUST GAS. *(Jidosha haiki gasu chu no tankasuiso sosei). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 6:72-84, 1975. 9 refs.*

Hydrocarbons in automobile exhaust gases at various running conditions were analyzed. A 4-cycle, 4-cylinder, 1600 cc gasoline engine (mileage 30,000 km) using regular gasoline and another (mileage 20,000 km) using regular and unleaded gasolines were used for the study. The exhaust gases were analyzed by gas chromatography with flame ionization detector. The column was a 3 mm by 1 m stainless steel tube packed with Porapack Q and T (1:1) (80/100 mesh), and the column temperature was room temperature using nitrogen as carrier gas. Results showed that saturated and aromatic hydrocarbons tended to decrease as the velocity increased at constant-velocity running. The unsaturated hydrocarbons increased from 33.6 to 53.7 mol% from 20 to 80 km/hr constant velocity. High aromatic hydrocarbon concentration (56.7%) was observed at deceleration. Approximately 50 mol% were c1-c3 hydrocarbons at all running conditions except deceleration. Regular and unleaded gasoline (unsaturated HC concent 16.7 mol% and trace, respectively) gave as much as 33.0 to 69.5 mol% unsaturated HC contents in the exhaust gas. The composition of HC in exhaust gas was found in general to depend primarily on operating conditions.

54140 **APTIC NO. 78806**

Uchimura, R.

POLLUTION CAUSED BY PETROCHEMICAL COMPLEX: PLANTS FOR BUTADIENE AND AROMATIC

HYDROCARBON. (Kagaku konbinato no kogai. Butazien to hokozoku kogai). Text in Japanese. Gijutsu to Ningen (Tech. Hum. Being), 4(9):112-117, Sept. 1975.

Characteristics of modern chemical industries, particularly the petrochemical complex, are described. The pollution caused by plants producing butadiene and aromatic hydrocarbons are discussed with description of production procedures for aromatic HC from cracked gasoline and butadiene from the C4 fraction. Pollutant sources in an aromatic HC extraction (sulfolane method) plants are ejector water containing 20-50 ppm of benzene and toluene; waste tar containing 90% of sulfolane; waste clay with adsorbed diolefins and waste cooling water; those in butadiene dimethyl formamide extraction method) plants are vent gas containing 29% of 1-3-butadiene, 3% ethyl acetylene, 5% 1-2-butadiene, 46% vinyl acetylene and 3% C5; water separated from starting material; solvent containing 200 ppm of chemical oxygen demand and 10 ppm of oily substance; and high boiling point products (tar) containing polymers such as butadiene dimer and decomposition products of DMF.

54141 **APTIC NO. 78464**

Varga, Istvan

ENVIRONMENTAL PROTECTION REQUIREMENTS AND OIL FIRING. *(Kornyezetvedelmi kovetelmenyek es az olajtuzeles). Text in Hungarian. Energiagazdalkodas, 16(5):217-223, May 1975. 9 refs.*

Environmental problems and regulations concerning oil firings are discussed. Oil firing produces nitrogen oxides, sulfur dioxide, sulfur trioxide, carbon monoxide and particulate matter, including oil coke and soot, which are harmful when combined. The hazards of SO2 can be reduced by increasing stack height. The formation of nitrogen dioxide and nitric oxide are influenced by secondary and primary air, respectively. The total nitrogen oxides emission is a function of load, flame temperature, and the oxygen content of combustion gases. Carbon monoxide is generated primarily in atomization burners, while conventional burners generate soot. Soot and oil coke formation is due to improper carburation and air distribution. To reduce odorous emissions, the flue gas carbon monoxide content should always be higher than 11%, even in small-capacity firings. Emissions can be reduced by proper adjustment of the burner, systematic boiler and burner inspection, and by the use of an optimized low excess air coefficient.

54142 **APTIC NO. 78898**

Worner, Howard K.

THE MODERN VULCANS. *Search, 6(5):157-166, May 1975. 12 refs.*

A general review of the status of the pyrometallurgical industry in Australia is presented, with reference being made to improvements resulting in reduced air pollution. An estimated 15-20% of the capital equipment in new steelworks is utilized for the cleaning of waste gases and other effluents. An increasing number of smelters are recovering a high proportion of the sulfur dioxide and particulates present in stack gas. Some sulfide smelters are still using tall stacks to disperse sulfur-containing gases at altitudes between 200 and 300 m above ground level where they are converted first into sulfur trioxide and then to ammonium sulfate. An upsurge of interest in continuous smelting/converting technology exists because of the process s potential for capital and operating cost savings and reduced emission of air pollutants. The continuous process produces a rich stream of sulfur dioxide which is suitable for acid manufacture and elemental sulfur production.

54143 **APTIC NO. 78968**

Yoshizawa, S.

POLLUTION AROUND BUILDINGS. *(Tatemono kinbo osen). Text in Japanese. Kenchiku Zasshi (J. Architecture Build. Sci.), 90(1097):770-772, Aug. 1975. 7 refs.*

The concept of environmental pollution is defined and analyzed from the architectural standpoint. The relationship between buildings and pollution around buildings (pollution damage to buildings, pollution originating in buildings, interference with air currents, pollution resulting from the use of buildings) is described. The effect of roads in cities, back currents of buildings, pollutant diffusion in urban areas, and effects of special building structures are discussed. Estimation methods for pollutant concentrations in highway construction and building construction, for concentration distributions around buildings, for increase in pollutant concentrations around buildings such as bus terminals, and for concentration increases around pollutant sources are described.

54144 **APTIC NO. 78462**

PRESENTATION OF A NEW SWEDISH INCINERATOR INSTALLATION FOR SOLID, SEMI-SOLID, AND PUMPABLE CHEMICALS. *(Destruktion av kemiavfall ID-etapp nr 3). Text in Swedish. Kem. Tidskr., 87(1-2)2):78-79, Feb. 1975.*

The new 9000 ton/yr-capacity incinerator units of AB Industridistillation AB near Stockholm, designed to incinerate solid, semi-solid and pumpable chemical wastes, including PVC and DDT, is described. Solid and semi-solid wastes are incinerated in a shaft furnace at 1000-1200 C. The charge being incinerated is not stirred to reduce ash and dust emissions. The combustion gases are afterburned with excess air. Pumpable wastes are incinerated in a turbofluid furnace at 1000-1200 C. The flue gases from all furnaces are cleaned in a common scrubber with lime water, and the cleaned gases are discharged to the atmosphere after passing through a droplet separator.

1974

54145 **APTIC NO. 78606**

Bergqvist, L. and R. J. Taft

AN ASSESSMENT OF THE HAYES SHELL-CAST COKELESS CUPOLA. *Preprint, Esso Reseach Center, Berkshire (England) and Hayes Shell Cast Holdings, 17p., 1974. (Presented at the International Symposium of Brussels 1974, Brussels, Belgium, 1974, Paper 7, Session A.)*

A typical foundry cupola has been successfully converted to operate on either gas or low sulfur distillate fuel. An analytical assessment of the cupola is presented, including history of development, description of the cupola itself, operation, metal temperatures, and iron quality. It is comparable in performance, both technically and economically, with the conventional cupola in many instances. The complete replacement of foundry coke has resulted in a reduction in pollution to levels low enough to meet the most stringent laws without the use of antipollution equipment. The plume has disappeared completely, the grit emission has been reduced from a typical 45 kg/hr to 4.5 kg/hr, and there are no sulfurous emissions. (Author abstract modified)

54146 **APTIC NO. 78565**

Bird, W. H. S.

NOISE AND ATMOSPHERIC EMISSIONS - AN AIRLINE VIEW. *Can. Aeron. Space J., 20(6):295-302, June 1974. 8 refs.*

Noise and exhaust emission problems associated with aircraft are discussed from the airlines point of view. The total atmospheric pollution (carbon monoxide, hydrocarbons, nitrogen oxides, and particulates) generated by commercial, military, and general aircraft amounts to only 3.2% of the toal from all sources, with commercial aviation s contribution being about 1% in the United States. The replacement of piston engines with more efficient gas turbine engines is responsible for significant reductions in aircraft exhaust emissions. Further reductions in emissions appear to involve huge costs for relatively negligible improvements. The Environmental Protection

Agency estimates that the total cost for an aircraft emission reduction program through 1990 will be about $141 million based on a 15- to 20-year airframe life.

54147 **APTIC NO. 78521**

Broderick, Anthony J.

PARTICLES IN HIGH-ALTITUDE AIRCRAFT EXHAUST. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 67-69, 5 refs. (Feb. 26-March 1.)*

NTIS, DDC. A003846

Measurements were made in an altitude simulation test cell on an afterburning turbojet engine to determine the nature and size distribution of particulate emissions under supersonic cruise conditions. The instrumentation used was a point-to-plane electrostatic precipitator. The engine was operated at maximum non-afterburning thrust at simulated altitudes from sea level to 65 km. An electron microscope was used in analyzing the exhaust particles. The vast majority of the aerosol consisted of carbon particulates much smaller than one micron in diameter. The particulates seem to be built up from small carbon spheres on the order of 50 angstroms or so in diameter. There is a large variance in median particle size, depending on the specific engine operating parameters, from about 400 angstroms to well below 100 angstroms. A typical median particle is only just over 100 angstroms in diameter.

54148 **APTIC NO. 78522**

English, J. Morley

AIR TRAFFIC PREDICTIONS FOR 1990-2000. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 16-48, 37 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Projections of the growth, altitude, speed, and geographical distribution of air transportation are made on the basis of the economic indicators of population and gross domestic product. These are related to a scenario for growth, predicted on continuation of present trends, to 2025. The influences that determine or limit growth are all assumed to be favorable, in order to establish upper-bound or worst-pollution conditions. Engine emissions per unit of traffic will decline if enough research and development effort is directed toward improving engine characteristics. Again, however, the emissions have been assumed to be those which would occur if no unusual effort were made to reduce them, so as to establish the worst-case condition. Predictions are made for global emission levels within 5 deg latitude and 5 deg longitude rigid squares for each 3 km altitude band. Carbon dioxide emissions are the most significant in terms of mass. The highest predicted concentration of nitrogen dioxide emissions is in the lowest altitude band, 9 km to 12 km, which is assumed to represent subsonic traffic. The highest emissions will occur in a zone covering North America, the Atlantic Ocean, and Europe. It is assumed that supersonic overflights will be permitted over all continental regions except the USA. (Author abstract modified)

54149 **APTIC NO. 78677**

Koshi, M. and Y. Ibaraki

A BASIC STUDY OF THE CORRELATION BETWEEN TRAFFIC CONDITIONS AND EXHAUST. *(Kotsu joken to jidosha haishutsu gasu no sokansei no kansuru kisoteki kenkyu). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, vol. 4:268-269, 1974. 3 refs. (Presented at the Japan Society of Civil Engineers, Lecture Meeting, 29th, Tokyo, Japan, 1974.)*

A study done using a traffic engineering approach is described. The purpose of the study was to establish relationship between the actual travelling mode and the volume of exhaust gas, and are estimate of total emission of pollutants from cars in 23 wards of Tokyo. Regression analysis was made of 36 types of actual travelling modes, and the amounts of carbon monoxide, hydrocarbons, and nitrogen oxides were estimated. Four parameters were used: travelling time per 1 km (sec/km), number of stops per 1 km (times/km), accumulated value of speed change per km, and the reciprocal of the average speed. A high correlation was obtained for CO, HC and NOx. The gross emission of smaller passenger cars and trucks was great, due to the fact that they travelled more miles. In the center of Tokyo, the gross emission of exhausts was 2-5 times greater than in other areas.

54150 **APTIC NO. 78520**

Leach, J. F., M. S. Morris, and P. Wardman

DISTRIBUTION OF EMISSIONS IN THE STRATOSPHERE FROM PRESENT AND FUTURE HIGH-ALTITUDE AIRCRAFT. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 70-78, 23 refs. (Feb. 26-March 1.)*

NTIS, DDC. AD A003846

Estimates are made of the fuel burned and oxides of nitrogen emitted by high altitude aircraft from previously published assessments of existing scheduled, non-scheduled, and cargo air traffic, and forecasts for the growth of these quantities. Traffic areas considered include U. S. domestic, Europe, Soviet Russia, the North Atlantic, the North Polar route, military operations, and supersonic transport operations. The estimates have used an assumed distribution of aircraft by flight level and a previously forecast increase in average cruise altitude to predict distributions of fuel burned and oxides of nitrogen emitted by latitude and altitude for the yr 1980 and 1990. Emissions of water vapor and sulfur dioxide are also briefly discussed. (Author abstract modified)

54151 **APTIC NO. 78670**

Masek, Vaclav

ON THE QUANTITY OF INHALABLE PORTION OF FLY-ASH IN COKE PLANTS. *(K jakosti vdechovatelnych podilu poletaveho prachu v banske kokosovne). Text in Czech. UHLI, 22(11):472-474, 1974. 3 refs.*

A total of 80 samples of dust were taken at three selected points during a five week period of 1973 at the Vitezny Unor coke plant in Ostrava-Privoza. The samples were analyzed by the dust meters DP 50 and BAT 1 and the relative accuracy of these two instruments was found to be good and about identical. The total average amount of dust per sample ranged from about 19%, of which about 36% was inhalable, to about 0.5%, of which about 70% was inhalable. The chemical analysis of fly-ash concentrated on establishing the presence of most harmful toxic substances, e.g., benzo(3-4)pyrene and heavy metals. The concentration of benzo(3-4)pyrene ranged from 608 to 36 microgram per gram and the concentration of heavy metals, such as lead and mercury, was from 15 to 4 microgram per gram. In addition, eight other pollutants were discovered in measurable quantities. It was concluded that the use of two-stage dust removers DP 50 and BAT 1 can provide a quick means for obtaining data on the composition of the dust and the samples of its inhalable portion that can be used in further analysis.

54152 **APTIC NO. 78441**

Oye, O. G. W.

THE ENERGY CRISIS AND NUCLEAR ENERGY. *(Energikrise og kjerneenergi). Text in Norwegian. Fra Fysikkens Verden, 36(2):31-38, 1974. 7 refs.*

General environmental problems of energy generation in fossil fuel-fired and nuclear power plants are discussed with respect to the recent energy crisis. The increasing exhaustion of the fossil fuel sources as a result of stepped-up energy production in the world has created a necessity for balanced energy production with respect to the availability of energy carriers, and for restraint in energy use. Fossil fuel-fired power plants generate environmental hazards due to thermal pollution, and the emission of carbon dioxide, sulfur dioxide, nitrogen oxides, and particulate matter. The increasing CO2 concentration in the atmosphere may lead to an increase in the overall temperature. When combined with industrial smoke, nitrogen oxides may produce photochemical smog. Nitrogen oxides are also believed to destroy the ozone belt in the stratosphere. Weighing the environmental hazards and availability of resources of fossil and nuclear energy indicates that nuclear energy is a feasible and necessary alternate energy source.

54153 **APTIC NO. 78597**

Pierson, William R., Robert H. Hammerle, and Joseph T. Kummer

SULFURIC ACID AEROSOL EMISSIONS FROM CATALYST-EQUIPPED ENGINES. *Preprint, Society of Automotive Engineers, Inc., New York, 5p., 1974. 16 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974.)*

Increased particulate emissions from automotive exhausts caused by oxidation catalysts were investigated. Experiments using an engine dynamometer show that the fuel sulfur emerges from the engine as sulfur dioxide. At 60 mi/hr road load, a monolithic oxidation catalyst converts almost half of the SO2 into sulfur trioxide, the bulk of which is emitted from the tailpipe as sulfuric acid droplets. The mass median diameter is smaller than 0.25 micron. Some ammonium sulfate is present, but the predominant sulfate species is H2SO4, totalling some 40% of the gross particulate mass depending on humidity. The rest is primarily water, associated with the hygroscopic H2SO4. The H2SO4 is less than one fiftieth as much without a catalyst as with a catalyst, the bulk of the fuel sulfur being emitted as SO2. (Author abstract modified)

1973

54154 **APTIC NO. 78582**

Chitu, Maria

THE FUNCTIONS OF THE CITY OF PLOIESTI AND THE POLLUTION OF THE ATMOSPHERE. *An. Univ. Bucur. Geogr. (Bucharest), vol. 1973:41-48, 1973. Translated from Romanian. In: Translations on Environmental Quality, no. 71, p. 6-13, Dec. 19, 1974. Joint Publications Research Service, Arlington, Va.*

NTIS: JPRS 63713

The city of Ploiesti has oil processing, machine building, chemical, food, textile, and building materials industries. It is an important railroad and road traffic center. Consequently, Ploiesti has a level of pollution. Contributing factors include the location of industrial enterprises in residential neighborhoods or of industrial areas in proximity of these neighborhoods, the incorrect location of some industrial units in the direction of prevailing winds, and the emission of excessive amounts of pollutants by some industrial enterprises. The pollutants affect the entire city, with the exception of the western areas which are far from the sources. The atmospheric pollution affects the health of the population. The use of technical procedures especailly involving dust and gas collectors and neutralizers, putting areas within the southern industrial zone to other purposes, and the expansion of open spaces may improve the situation.

54155 **APTIC NO. 78503**

Nicholson, W. J. and F. L. Pundsack

ASBESTOS IN THE ENVIRONMENT. *In: Biological Effects of Asbestos. Lyon, France, International Agency for Research on Cancer, 1973, p. 126-130.*

Asbestos contamination of the environment is discussed in terms of natural and anthropogenic sources of the material, sampling and analytical techniques, and air quality measurements for major metropolitan centers in the United States. Asbestos contamination can result from the mining and processing of the mineral as well as the fabrication and application of asbestos-containing materials. The only effective analytical technique for determining the asbestos content of ambient air samples is electron microscopy because of the presence of much greater amounts of other inorganic and mineral materials in asbestos-containing samples. High-volume pumps are used in most instances for the collection of samples. Chrysotile asbestos is present at concentrations of nanograms/cu m in the air of major American cities, and in some cases levels of approximately 100 times background are reported.

54156 **APTIC NO. 78787**

Rimatori, V., B. Sperduto, F. Cotta Ramusino, and G. Cecchetti

METHODS OF SAMPLING AND ANALYSIS OF PARTICULATE OIL AEROSOL IN THE WEAVING ROOMS OF THE WOOL INDUSTRY. *(Metodiche di campionamento e di analisi dell aerosol di olio particolato nelle sale tessitura dell industria laniera). Text in Italian. Ann. Ist. Super. Sanita (Rome), vol. 9:544-551, 1973. 8 refs.*

Methods of sampling and analysis of particulate oil aerosols in the weaving rooms of wool mills are described. Sampling is done with a four stage cascade impactor and particulate analysis is made on a microscope using reflected light and transmitted light techniques. Validity is checked using the interferential contrast in the transmitted light technique. Oil is sampled both on filters and on hexane. A quantitative analysis is made with a differential refractometer equipped with a prism monochromator on the filter washing solutions and on concentrated absorption solution. The values are compared with a calibration curve obtained from standard solutions of the oil used in the looms. Measurements show an error of + or - 0.18 mg/ml.

54157 **APTIC NO. 78579**

Wernli, S.

MODERN INDUCTION MELTING PLANTS WITH AN EXAMPLE OF A NOVEL FOUNDRY TECHNIQUE. *(Impianti moderni di fusione a induzione, con un esempio di un nuovo concetto industriale in una fonderia). Text in Italian. Fonderia Ital., 22(5):145-152, May 1973.*

A comparison between three melting procedures (cupola, arc, and induction melting furnaces) shows that induction melting creates a minimal amount of pollution, which is due to the impurities introduced along with the scrap materials; there is hardly any iron oxidation. The induction melting furnace does not require a dust separating system for air protection nor a succession of channel furnaces. The consumption of electricity is significantly below that of arc furnaces. A novel feature of the modern foundry is the installation of a pre-heater for the scrap; it is thereby possible to increase production by approximately 30%. Furthermore, foundry production can be increased by reducing the times during which the electrical installation is only being used partially.

54158 **APTIC NO. 78568**

Wogrolly, Ernst, Wilhelm Strauss, and Ernst Schmitz

CHLORIDE IMMISSION MEASUREMENT IN THE ENVIRONMENT SURROUNDING THE REFUSE COMBUSTION PLANT ZELTWEG OF VOEEST-ALPINE. *(Chlorid-Immissionmessungen in der Umgebung der Muellvervrennungsanlage Zeltweg der Voeest-Alpine). Text in German. Oesterr. Kunstst. Z., 5(5/6):80-85, 1973. 7 refs.*

Atmospheric measurements were made of the chloride emissions in the environment surrounding the refuse combustion plant Zeltweg of Voeest-Alpine. Increasing the Cl content of refuse with polyvinyl chloride does not increase hydrogen chloride emissions of refuse incinerators in the same proportion because 75-90% of the HCl is absorbed by ash and filter dust. For 1 hr the chloride emission concentration was determined by 225 single measures; 71.5% of these samples in the immediate surroundings has a concentration of 10 micrograms/cu m of air, while in the samples taken at greater distances from town only [illegible].6% had a chloride content of 10 micrograms/cu m. The refuse incinerator does not affect Cl-pollution of the surroundings.

CONTROL METHODS

1975

54159 **APTIC NO. 78844**

Adachi, Kyohiro and Teruaki Kazuma

DUST-COLLECTING EQUIPMENT. *(Shujin sochi). Text in Japanese. (Ebara Manufacturing Co., Ltd. (Japan)) Japan. Model Util. Sho 50-20391. 5p., June 20, 1975. 1 ref. (Appl. Oct. 30, 1970, 1 claim).*

The dust collector described her consists of an electrostatic precipitator and a multicyclone. Gas for treatment was introduced from the top of a cylindrical casing in which the separator and collector of the electrostatic precipitator and the multicyclone were arranged in vertical series. A number of parallel plates were fixed in the separator and in between the plates were placed thin discharging wires or needle discharging electrodes. Particles in the gas were charged and then separated by the dust collecting electrodes in the collector which followed the separator. The resulting gas was led through a connecting duct to a number of inclined cyclones. The clean gas was released from a gas outlet at the middle of the casing. An inner hopper was equipped immediately after the collector of the precipitator and an outer hopper was used to collect the dusts removed by the multicyclone. The device features small equipment size with high performance.

54160 **APTIC NO. 78445**

Afzal, M. and Jamil Ahmed

THE SURFACE FILM PRESSURE COMPUTATIONS FROM THE ADSORPTION DATA OF ORGANIC VAPOURS ON CARBON BLACK. *Colloid Polymer Sci., 253(8):635-642, 1975. 12 refs.*

The surface film pressure for the adsorption of methanol, methyl formate, methyl acetate, methyl cyanide, acetaldehyde methyl ethyl ketone, and acetyl chloride on carbon black was computed. At 25 C and at a pressure of 2.72 mm, the values obtained were: methyl alcohol (0.24), methyl formate (0.71), acetaldehyde (2.25), methyl cyanide (2.44), methyl acetate (2.98), acetyl chloride (4.01), and ethyl methyl ketone (20.17), all values in ergs/ sq cm. At a pressure of 20.09 mm, the values were: methyl formate (17.85), methyl alcohol (17.91), acetaldehyde (21.76), acetyl chloride (36.25), methyl cyanide (44.78), methyl acetate (50.68), and ethyl methyl ketone (88.13).

54161 **APTIC NO. 78778**

Asseff, Peter A., T. Kasai, and A. Towle

INTERRELATION BETWEEN FUELS, LUBRICANTS AND AUTOMOTIVE ENGINE ANTI-POLLUTION DEVICES. *Preprint, World Petroleum Congress, Japanese Organizing Committee, 9p., 1975. 40 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

The interrelationship between fuels, lubricants, and automotive engine anti-pollution devices is reviewed. Twenty-fiver percent of the hydrocarbon emissions from uncontrolled cars are attributable to crankcase venting. Problems with crankcase emission control devices results from a tendency for deposition of sludge and varnish to clog the valve which controls the flow of blowby gases into the engine intake system. The use of detergents/dispersants in both the fuel and lubricant significantly retards valve plugging. Multifunctional gasoline additives do not affect the efficiency of systems for controlling evaporative emissions. The majority of 1975-1976 United States cars are equipped with a spark ignition combustion engine with a noble metal oxidation type catalytic converter for control of hydrocarbons and carbon monoxide. Exhaust gas recirculation and reduction type catalytic converters are used to control nitrogen oxides. The oxidation type catalysts are poisoned by lead and phosphorus in the fuel. The use of unleaded gasoline improves the anti-rust and anti-oxidant characteristics of a given lubricant but aggravates problems associated with wear, copper/Pb bearing corrosion and varnish deposits. (Author conclusions modified)

54162 **APTIC NO. 78702**

Auras, H., H. Boerstinghaus, and U. Fox

USE OF WASTE HEAT AT SELF-SUPPLY WITH POWER ON NATURAL GAS BASIS WITH TOTAL-ENERGY-PLANTS. I. DESIGN AND OPERATION OF TOTAL ENERGY PLANTS AND GENERAL ECONOMIC CONSIDERATIONS. *(Abwaermenutzung bei Eigenstromversorgung auf Erdgasbasis mit Total-Energy-Anlagen. Teil I: Aufbau und Arbeitsweise von Total-Energy-Anlagen und allgemeine wirtschaftliche Betrachtungen). Text in German. Heizung Lueftung Haustech., 26(1):19-23, 1975.*

The general technical and economical aspects of total energy systems are presented on the basis of examples from the Netherlands. The increasing price of electricity from mains has led to new concepts of energy supply for large consumers, such as office buildings, hospitals and apartment houses. The natural gas-operated total energy plant used for such purposes is designed to supply all electricity needed for internal consumption by means of low-speed gas engines. The thermal energy needs of the same consumption unit are covered by partial recovery of the waste heat in the hot cooling water and lubricant oil by means of heat exchangers integrated within the total energy plant, and by means of absorption coolers for air conditioning purposes. The extensive use of total energy systems for large consumers, including greenhouses, could result in a reduction of the total natural energy need of the Netherlands by 6%. It would also be possible to use sewer gas generated in biological wastewater purification plants.

54163 **APTIC NO. 78776**

Axtmann, Robert C.

EMISSION CONTROL OF GAS EFFLUENTS FROM GEOTHERMAL POWER PLANTS. *Environ. Letters, 8(2):135-146, 1975. 25 refs.*

The effluents from six geothermal fields are compared in magnitude with each other and with those from fossil fueled plants. Geothermal steam at the world s five largest power plants contains from 0.15 to 30% noncondensable gases including carbon dioxide, hydrogen sulfide, hydrogen, methane, nitrogen, boric acid, and ammonia. At four of the plants the gases are first separated from the steam and then discharged to the environment. At the fifth, the noncondensables exhaust directly to the atmosphere along with spent steam. Some CO2 and sulfur emission rates rival those from fossil fueled plants on a per megawatt-day basis. The ammonia and boron effluents interfere with animal and plant life. Most geothermal turbines are equipped with direct contact condensers which complicate emission control because they provide two or more pathways for the effluents to reach the environment. Use of direct contact condensers permits emission control if coupled to processes that produce saleable quantities of purified CO2 and elemental S. (Author abstract modified)

54164 **APTIC NO. 78981**

Azuma, Tadahiro, Kaoru Sato, Yasuo Hyobara, Isao Nagaishi, Fumio Tsujimoto, and Hiroshi Tomoto

DEVELOPMENT OF LOW NOX BURNER (PART I). *(Tei NOx nana no kaihatsu -I). Text in Japanese. Preprint,* *Osaka Prefectural Industrial Research Inst., p. 25-26, 1975. 2 refs. (Presented at the Osaka Prefectural Industrial Research Institute, Study Meeting, Osaka, Japan, 1975.)*

A low nitrogen oxides burner was studied. Previously a correlation between the distribution of the temperature and the NOx concentration in the flame of the burner was studied, and it was concluded that the lower temperature of the flame served to depress an occurrence of NOx. According to this conclusion, a two-stage combustion burner was manufactured for trial. Measurement of the concentration of NOx against the ratio of oil and air was made in this burner. The best case of 75 ppm of NOx concentration was obtained at about 1.2 of the air ratio. Such an unexpectedly high concentration of NOx might be produced by an existence of local high temperature region in the second combustion area.

54165 **APTIC NO. 78433**

Baer, Donald G. and Anders F. Jepsen

AMBIENT GROUND LEVEL MONITORING: A SENSIBLE CONTROL SYSTEM FOR THE INDUSTRY. *ISA (Instr. Soc. Am.) Trans., 14(2): 152-160, 1975. 10 refs. (Presented at the ISA Power Instrumentation Symposium, International, 7th, Boston, Mass., May 20-22, 1974.)*

A fuel switching program controlled by ambient ground level monitoring is proposed as a sensible control system for the steam-electric power generating plants. This system permits power plants to effectively control the emissions relative to ambient levels with moderate investment. It is considered a reasonable substitute for the expensive supplementary system proposed by the Environmental Protection Agency that may require capital investment cost of $240,000 with an annual operating cost of $125,000. The estimated cost of this system is $8000 per monitoring site, including those components in the central control station, less the printout unit, the sites required for each system. The system is capable of achieving the results proposed in the American Electric Power System appeal to the President and to satisfy the requirements of the Clean Air Act. (Author summary modified)

54166 **APTIC NO. 78712**

Bakhshi, Narendra N., Randal G. Gillies, and Pradeep Khare

TREATMENT OF TAR SANDS TAILINGS WITH FLY ASH. *Environ. Sci. Technol., 9(4):363-364, April 1975. 3 refs. (Presented at the Solids Handling for Synthetic Fuels Production Symposium, Los Angeles, Calif., March 31-April 4, 1974.)*

Large quantities of tailings are obtained during the recovery of bitumen from the Alberta oil sands. Disposal of these tailings is a tremendous pollution problem. Fly ash was used to treat these tailings. Various dosages of fly ash, 4, 5, 6, 7, and 8 g per 50 g tailings, were stirred with 50 g samples for 30 min and then filtered under aspiration for 30 min. Fly ash dosage of 6 g gave the best results: maximum amount of clear filtrate and a fairly dry filter cake. Based on this optimum dosage, one imperial gal (4.546 times 10 to the -3 power cu m) of tailings results in 5.93 lb (2.69 kg) of filter cake and 0.537 imperial gal (2.441 times 10 to the -3 power cu m) as filtrate which could be recycled into the plant operation. At this optimum dosage, the filtrate had a pH of about 11, a chemical oxygen demand value of about 350 mg per l and a color index of about 46. (Author abstract)

54167 **APTIC NO. 78887**

Balkan, Saban

THERMAL ENERGY STORAGE SYSTEMS FOR POLLUTANT-FREE OPERATION OF AUTOMOBILES. *(Waermespeicherantriebe fuer einen schadstofffreien Fahrzeugbetrieb). Text in German. VDI (Ver. Deut. Ing.) Z. (Duesseldorf), 117(9):422-429, 1975. 13 refs.*

A thermal energy storage system as an energy source for the pollution-free operation of motor vehicles is described. Due to the thermal energy storage, there is no combustion process, and consequently no pollutant emission. Thermal energy, suitable for the propulsion of large vehicles, such as autobusses, is stored in eutectic salt mixtures, such as one of sodium fluoride, lithium fluoride, and sodium chloride in a closed, heat-insulated metal vessel with electrical heating. The thermal energy stored in the fused metal salts is used for steam generation for Stirling engines, steam engines, or other external-combustion engines. A working temperature of 500-700 C for the drive motor, a theoretical fusion point of 570 C, and a heat of fusion of 137.5 Wh/kg were reached. The use of heat energy storage systems for propulsion is determined essentially by the possible energy density and power density. An energy density of 200 Wh/kg would be sufficient for vehicles for city traffic.

54168 **APTIC NO. 78692**

Bradbury, Raymond A.

DIESEL HAULAGE EXPERIENCE IN THE MARTIN COUNTY COAL CORP. WITH EMPHASIS ON HEALTH AND SAFETY ASPECTS. *Bureau of Mines Information Circ., vol. 8666:92-99, 1975. (Presented at the Symposium on the Use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)*

The health and safety aspects of using diesel hauling equipment in underground coal mines are discussed. Carbon monoxide and nitrogen oxides (nitrogen dioxide) are diffused and dispersed by the scrubber and then diluted and carried away by the mine ventilation air current. Indicator tubes with CO and NO2 detectors are used to detect any changes in the engine exhaust to make corrections. The allowable limits used by the Federal Bureau of Mines are 5 ppm of NO2 and 50 ppm of CO. The ventilation requirements for use of diesel powered equipment are high. For one 150 hp rated engine, at least 17,000 cfm is required.

54169 **APTIC NO. 78745**

Brink, David L. and Jerome F. Thomas

PYROLYSIS-GASIFICATION-COMBUSTION: DESIGN OF AN EXPERIMENTAL UNIT USED FOR STUDY OF HEAT AND CHEMICAL RECOVERIES FROM PULPING LIQUORS. *TAPPI, 58(4):142-145, April 1975. 8 refs.*

An experimental unit was designed to pyrolyze and completely gasify the organic content of concentrated pulping liquors (kraft and neutral sulfite semichemical). It operates at rates of up to 1 ton/day of kraft black liquor solids. Products are heat, a pyrolysis (fuel) gas, and smelt. The pyrolysis gas is is comprised of hydrogen, carbon monoxide, carbon dioxide, methane, hydrogen sulfide, nitrogen, water vapor, and traces of ethane and ethylene. All compounds typical of the total reduced sulfur content of recovery furnace emissions, except H2S, are absent. Smelt, comprising sodium carbonate, and sodium sulfide, issues as a molten stream from the unit. Background work carried out which lead to the construction of the experimental unit is summarized. The basis for using a two stage system and some potential benefits which could accrue through its application in the pulping industry are discussed. Descriptions of the experimental unit and aspects of its operation are presented. (Author abstract modified)

54170 **APTIC NO. 78770**

Brown, R. W., J. W. DiLuzio, D. E. Kuhn, and C. G. Rapp

BLACK LIQUOR EVAPORATION AND ODOR CONTROL IN SULFUR-FREE ALKALINE PULPING. *TAPPI, 58(4):94-97, April 1975. 7 refs. (Presented at the Technical Association of the Pulp and Paper Industry, The American Paper Institute, and Forest Products Laboratory Nonsulfur Pulping Symposium, Madison, Wisc., Oct. 16-18, 1974.)*

The problems and solution of black liquor evaporation and odor control encountered in the operation of a sulfur free alkaline pulp mill are reported. Tube fouling within various evaporator bodies is noted shortly after startup. Studies of black liquor chemistry, single tube evaporation experiments, and pilot concentrators identify limiting chemical factors and modifications to the evaporating plant and recovery cycle which result in satisfactory performance. The elimination of the major sulfur input dramatically reduces the S content of the liquors and the odor intensity and its radius of detection in the neighborhood. Further odor reduction is obtained when one of the major malodorous emission sources is collected and scrubbed with mill effluent containing residual chlorine. Complete elimination of odor is anticipated when the second major odor source is also tied in. (Author abstract modified)

54171 **APTIC NO. 78601**

Crothers, W. T. and C. J. Anderson

A PRACTICAL APPROACH TO THE INTRODUCTION OF ALTERNATE AUTOMOTIVE FUELS. *California Univ., Livermore, Lawrence Livermore Lab., Energy Research and Development Contract W-7405-Eng-48, Rept. UCRL-51779, 20p., March 1975. 26 refs.*

Current automobiles with minor mechanical changes and an advanced closed-loop computer-controlled fuel and ignition management system can facilitate the introduction of alternate fuels, particularly methanol, while simultaneously providing higher efficiency and lower emissions. A novel fuel tank designed to be used with electronic fuel injection will facilitate the introduction of alternate fuels. A computer control system with closed-loop monitoring of engine operation will be used to operate and optimize the fuel and ignition systems. An economic evaluation is given. (Author abstract modified)

54172 **APTIC NO. 78724**

Dabelstein, W. E. A., E. K. Walter, E. G. Zeschmann, P. Hofbauer, and B. W. H. Wiedemann

THE INFLUENCE OF EXHAUST EMISSION CONTROL ON ENGINE DESIGN AND FUEL QUALITY: A BENEFIT/COST ANALYSIS. *Preprint, World Petroleum Congress, Japanese Organizing Committee, Tokyo, 11p., 1975. 15 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

Various types of engines are discussed, including internal continuous combustion engines, internal cyclical combustion turbines, and external continuous combustion. Reciprocating engines with internal cyclic combustion are regarded as a promising solution for the foreseeable future. Hence fuel concerns center on the problem of anti-knock quality and the cost of lead reduction. Because the benefits of exhaust purification cannot be described purely in monetary terms, a system of control objectives regarded to be a meaningful approach to a benefit/cost analysis is proposed. (Author abstract modified)

54173 **APTIC NO. 78914**

Doerfer, Hubertus

SURVEY ON THE STATE OF DEVELOPMENT OF DUST CLEANING METHODS AND DUST SEPARATORS FOR LARGE DRILLING MACHINES. *(Uebersicht ueber den Entwicklungsstand von Entstaubungsverfahren und Entstaubungsgeraeten fuer Grosslochbohrmaschinen). Text in German. Neue Bergbautech., 5(4):270-276, 1975. 4 refs.*

Dust cleaning methods and apparatus for dust separation for large drilling machines used in open workings in East Germany are described. While the dust generated during drilling could be separated most efficiently by flushing with water, this method has only limited application in open workings, and foam flushing has the disadvantage of being expensive and complicated. Combined flushing with air and water droplets has low efficiency for respirable dust. Dry dust suction with dust separation by means of cyclones, tissue filters, filter packings, electrostatic and wet type dust separators has a very high efficiency. A combination of cyclones and tissue filters was found to have an efficiency over 99%.

54174 **APTIC NO. 78813**

Fischer, Siegfried

VIEWPOINTS CONCERNING THE USE OF THE ENERGY OF WASTE GASES FROM GAS TURBINES FOR POWER GENERATION IN THE GDR. *Gesichtspunkte fuer die Nutzung der Energie der Abgase von Gasturbinenanlagen in der Energiewirtschaft der DDR). Text in German. Energietechnik, 25(5):210-218, 1975.*

Economic considerations on the use of flue gas waste heat in gas turbine plants in East Germany are presented. Low-grade brown coal, and limited quantities of heavy fuel oil are used for energy generation. Due to the tense situation of the fuel market, the use of pure gas turbines in peak load operation is acceptable with steam injection or heating steam generation. However, there may not be special requirements on the availability of this heating steam. The coupling of waste heat utilization, i.e., of process steam generation or succeeding steam turbine, has a longer operating time annually. The waste heat is best utilized to satisfy the remote heat base load. Provided low-grade natural gas or other appropriate fuel, e.g., from coal gasification, can be secured in the future, it would be best to use gas turbine plants with succeeding condensing steam turbines for electricity generation in the medium load range.

54175 **APTIC NO. 78691**

Gantz, R. G., L. W. Cresswell, and J. F. Gauen

PONTOON SYSTEM AUTOMATED FOR SLOP RECOVERY. *Hydrocarbon Process., 54(3):93-96, March 1975. 2 refs.*

The reduction of vapor emissions from oil water separators while automatically recovering oil from the separator using an improved pontoon floating cover system is discussed. Environmental regulations require control of hydrocarbon emission losses from refinery oil water separators. These laws apply to separators recovering more than 200 gal/day oil with a Reid vapor pressure exceeding 0.5-1.5 psi and require some positive cover over the separator. The system described here satisfies environmental requirements and the covers have the unique feature of automatic pump out for oil accumulating underneath the pontoons.

54176 **APTIC NO. 78836**

Gitter, H.

FURTHER DEVELOPMENT OF DIESEL ENGINES. THE INTERPLAY OF THEORY AND PRACTICE. *(Weiterentwicklung des Dieselmotors - Ergebnisse der Wechselwirkung von Theorie und Praxis). Text in German. Maschinenbautechnik, 24(3):98-102, 1975. 7 refs. (Presented at the Magdeburg Symposium Internal Combustion Engines 3rd, East Germany, 1974.)*

Environmental and other aspects of the further development of diesel engines are discussed with special regard to the situation in East Germany. Compared with spark ignition engines, diesel engines emit larger amounts of soot and malodorous substances, but lower quantities of carbon monoxide and unburned hydrocarbons. Future efforts to reduce the harmful emissions should concentrate on the abatement of nitrogen oxides, soot, and CO emissions. As the nitrogen oxides emission is a function of the peak temperature and of the local mixture composition, thay can be reduced by modifications of the engine design. Improvement of the turbulence within the combustion chamber is rated as the most efficient method of reducing the nitrogen oxides emissions. A considerable reduction of the soot emissions is expected from new fuel additives.

54177 **APTIC NO. 78826**

Hakala, N. V. and D. G. Levine

THE ROLE OF GASOLINE IN AUTOMOTIVE EMISSION CONTROL. *Preprint, World Petroleum Congress, Japanese Organizing Committee, 9p., 1975. 24 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

The effect of emission control on requirements for gasoline and the performance of engines is reviewed. Intermediate emission control systems reduce emissions of oxygenated hydrocarbons and polynuclear aromatics as well as reducing the mass emissions of carbon monoxide, hydrocarbons, and nitrogen oxides. The specific reactivity of the hydrocarbons emitted from these systems is relatively independent of fuel composition and similar to the specific reactivity of the hydrocarbons emitted by precontrol vehicles. Catalytic systems virtually eliminate reactive hydrocarbon emissions, oxygenates, and polynuclear aromatic hydrocarbons. These systems have a potential problem with sulfate emissions which are formed by the oxidation of fuel sulfur. Additives which improve cylinder to cylinder fuel distribution can also improve driveability and reduce emissions. These problems should disappear, in part, when catalytic advanced emission control systems are introduced.

54178 **APTIC NO. 78471**

Hara, Kenji

DUST REMOVAL EQUIPMENT FOR BLAST FURNACE. *(Yokairo no jojin sochi). Text in Japanese. Kenji Hara (Japan)) Japan. Pat. Sho 50-24742. 4p., Aug. 18, 1975. (Appl. Oct. 7, 1971, 1 claim).*

The dust removal device for a blast furnace consists of a cyclone dust collector and a spiral dust collector with umbrella type head and water spraying system. Double stacks from a blast furnace are connected to the cyclone body tangentially. Heavier particulates separated in the cyclone are collected in the hopper at the bottom and discharged. At the upper end of the cyclone, numerous chains are hung, where some particulates in exhaust gas are knocked down. In the spiral dust collector, particulates are separated by the action of a spiral blade and collected on metal netting surrounding the spiral blade, and are subsequently washed down by the water sprayer. One or more cold air injection ports with fans are attached to the spiral dust collector, so that the air can be injected in a tangential direction to facilitate the flow of exhaust gas. The exhaust gas let out of the spiral dust collector is sprayed with water for the removal of fine particulates before being discharged.

54179 **APTIC NO. 78449**

Harada, Tetsuya and Ryo Terao

A VALVE CONTROLLING THE CIRCULATION OF EXHAUST GAS. *(Haikigasu kanryuryo seigyoben). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-4895. 2p., Feb. 10, 1975. (Appl. Aug. 9, 1971, 1 claim).*

A device which suppresses nitrogen oxides emission from automotive combustion is described. The recirculationn of exhaust gas lowers the temperature of the combustion system and results in lower concentration of NOx in the exhaust gas. A constant ratio of the amount of recirculation exhaust gas to that of intake air must be maintained. Control of the amount of recirculation is achieved by detecting the pressure difference between the exhaust system and the output part of the intake air pump. In this device, the control valve of recirculation flow is connected to a flexible wall which moves due to the pressure difference between the exhaust system and the output position of the air pump.

54180 **APTIC NO. 78450**

Harada, Tetsuya and Ryo Terao

A VALVE CONTROLLING THE RECIRCULATION OF EXHAUST GAS. *(Haikigasu kanryuryo seigyoben). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama, (Japan)) Japan. Model Util. Sho 50-4896. 2p., Feb. 10, 1975. (Appl. Aug. 11, 1971, 1 claim).*

Nitrogen oxides emissions can be suppressed by the recirculation of some of the exhaust gas into the combustion system. The amount of the recirculation gas has to be controlled depending on the temperature of the combustion system. This device recirculates gas when the temperature of combustion system is high by detecting the pressure difference between the exhaust system and the carburetor vent. The pressure difference is detected by a flexible wall dividing two chambers, each of which is connected to the exhaust system and the carburetor vent. On the flexible wall, a valve rod is fixed and the position of the valve is controlled by the motion of the wall. When the temperature of the combustion system is high, the pressure of carburetor becomes lower than that of exhaust system. In such cases, the flexible wall moves to the chamber of carburetor side and the recirculation control valve opens.

54181 **APTIC NO. 78657**

Harima, Mikio

CLEAN FUEL PRODUCTION AND RECOVERY OF SULFUR. *(Kurin energi no seizo to io no kaishu). Text in Japanese. Kankyo Sozo (Environ. Creation), 5(8):61-67, Aug. 1975.*

Processes and problems associated with obtaining clean energy from fossil fuels by desulfurization are discussed. Currently, heavy oil desulfurization produces the most desirable amounts and qualities of clean fuel, economically, for Japan. Gasification-desulfurization processes are high in cost, but produce higher degrees of desulfurization, without the troublesome occurrence of asphaltum. Direct production of electric power by gas turbines by using gas obtained by gasification of heavy oil is under consideration. Manufacture of city gas in Japan from coal, heavy oil, naphtha, crude oil, LPG, LNG, had a long history. Since a dependable supply of naphtha may not be available in the future, improved conversion of crude oil, heavy oil, coal into city gas is under study. Production of clean energy gas from coke oven gas (COG) and from coal is feasible, but entails treatment of secondary pollution products. Methanol fuel can be obtained from catalytic reaction of methane and natural gas with steam, but construction and operation of facilities involve politics in the countries with the resources, as well ad capital outlay. Clean energy from hydrogen is possible, if cheap electric power is available for electrolysis of water. Manufacture of clean energy gas depends on recovery of sulfur from the products of the desulfurization processes. In general, it is economically desirable to use stack-gas desulfurization installations for large-scale boilers, which can use crude oil at a low price; and to use clean fuel and curtail use of stack gas desulfurization equipment for small-type boilers. Utilization of suitable combinations of various processes is often the answer to clean energy. Listings of processes and flow sheets are included.

54182 **APTIC NO. 78627**

Hart, Anthony

FUEL FOR THOUGHT. *Chem. Brit., 11(2):55-59, Feb. 1975. 15 refs.*

The use of batteries and fuel cells for powering non-polluting motor vehicles is discussed against the background of recent and ongoing developments in electrochemical research. Topics discussed include: improvements in electrode, separator, and electrolyte materials; specific power and storage requirements for battery-powered vehicles; possible alternative battery cell oxidants in the face of limitations on oxygen electrodes; and the design of high power density fuel cells.

54183 **APTIC NO. 78941**

Hashimoto, Yukio and Shigeru Doi

EXHAUST GAS PURIFICATION METHOD OF PETROLEUM STORAGE TANK. *(Sekiyu rui chozo tanku haishutsu gasu seijoka hoho). Text in Japanese. (Nippon Oil Co., Ltd. (Japan)) Japan. Pat. Sho 50-18881. 5p., July 2, 1975. 1 ref. (Appl. Sept. 30, 1968, 1 claim).*

A method of purification for the exhaust gas from a petroleum tank, using alkaline solutions, is described. The exhaust gas, containing hydrogen sulfide and mercaptans, was led from the gas outlet of a storage tank to the first purification tower to which alkaline solution was circulated. Hydrogen sulfide and part of the mercaptans were removed by the alkaline solution. The resulting gas was then introduced to the second purification tower to which an alkaline solution containing an oxidizing agent was circulated. The remaining mercaptans were removed at the second tower. The oxidizing agents used were (1) sulfur dyes containing metal compounds, (2) metal-phthalocyanine compounds, (3) Doctor solution, (4) copper chloride, (5) lead sulfide, and (6) potassium ferrocyanide. Exhaust gas containing more than 800 ppm H2S and more than 150 ppm methyl mercaptan was purified with 100% H2S removal and 94-100% CH3SH removal.

54184 **APTIC NO. 78468**

Hasui, Hiroshi

PARTICULATES SEPARATION DEVICE FOR INTERNAL COMBUSTION ENGINE EXHAUST GAS. *(Nainen kikan haikichu no biryushi bunri sochi). Text in Japanese. (Nihon Radiator Co., Ltd., (Japan)) Japan Model Util. Sho 50-28262. 3p., Aug. 21, 1975. 1 ref. (Appl. Dec. 4, 1970, 1 claim).*

A particulate separator was designed for an internal combustion engine exhaust system. The exhaust pipe and one or two cyclone type particulate separators are placed in parallel position in the casing. The end of the exhaust pipe is connected to the injection port of the cyclone, so that the exhaust gas is injected at an angle. The casing also functions as a receptor for particulates separated by the cyclone, which can be removed readily from the casing by unbolting the back panel of the casing.

54185 **APTIC NO. 78640**

Henderson, R. D.

DIESEL TECHNOLOGY. *Bureau of Mines Information Circ., vol. 8666:59-76, 1975. (Presented at the Symposium on the Use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)*

The use of diesel engines in underground mining is discussed with emphasis on diesel exhaust emissions and their control. The diesel engine is a relatively low emitter of the invisible emissions carbon monoxide and nitrogen oxides. Low emissions and the use of a nonvolatile fuel provide a solid basis for selecting the diesel for mining machinery power while protecting the health and safety of the people working in the mines. Mine ventilation requirements resulting from engine operation normally hinge on the oxides of nitrogen. The time factor required in the conversion of the nitric oxide in the exhaust to nitrogen dioxide allows some removal from the mine before the reaction is complete. The atmosphere in the mine can be maintained at a safe level without health hazard regardless of the engine selected by introducing sufficient ventilation air. Exhaust gases require dilution in some manner to protect the machine operator. Some way is needed to mix the exhaust gas and air such as proper positioning of the exhaust outlet, discharging the exhaust gas into the engine cooling fan blast, or pumping dilution air into the exhaust gas in some kind of mixing chamber.

54186 **APTIC NO. 78458**

Honda, Hidemi

EXHAUST GAS PURIFYING EQUIPMENT WITH MUFFLER. *(Haiki gasu jyokoasochi o sonaeta shoonki). Text in Japanese. (Hino Motors Co., Ltd., Hino (Japan) Japan. Model Util. Sho 50-20190. 2p., June 19, 1975. 1 ref. (Appl. Aug. 8, 1970).*

An exhaust gas cleaning apparatus combined with an auto exhaust muffler is described. The exhaust gas cleaning is done by water, and the apparatus is attached to the end of muffler. The engine exhaust gas entered into the ordinary muffler and its effluent passes a gas dispersion disc for the generation of random gas flow before entering into the cleaning apparatus. There are two water sprinklers in the apparatus to remove harmful components from the exhaust gas. The water, together with the harmful components, return to a water tank and is recirculated by a pump after passing through a filter. The cleaned exhaust gas hits a baffle to remove water before it is emitted into the atmosphere.

54187 **APTIC NO. 78707**

Hori, R., K. Oishi, T. Yaegashi, and H. Miyagi

DEVELOPMENT OF TOYOTA CATALYTIC CONVERTER. *(Shokubai konbata no kaihatsu). Text in Japanese. Toyota Gijutsu (Toyota Eng.), 24(4):517-529, July 1975.*

The Toyota catalytic converter system was developed to comply with 1975 Automotive Emission Control Regulations. Basic factors of converter performance such as cleansing efficiency, durability of catalyst, structure of catalytic converter and relationship to automobile performance are discussed, with experimental data. Design specifications for four types of pellet catalytic converters (axial flow, radial flow, separate flow and down flow) are given, with description of gas flow distribution pattern, catalyst bed, and converter housing. For the improvement in durability, reliability, and converter efficiency, the bench tests were repeated using pilot catalytic converters. The problem of converter heating during abnormal engine operation is also discussed.

54188 **APTIC NO. 78708**

Hori, R., K. Uchida, H. Kinoshita, and S. Sakurai

RESEARCH AND DEVELOPMENT OF TOYOTA OXIDATION CATALYTS FOR EXHAUST EMISSION CONTROL. *(Jidosha bishutsu gasu jokayo sanka shokubai no kaihatsu). Text in Japanese. Toyota Gijutsu (Toyota Eng.), 24(4):504-516, July 1975. 12 refs.*

The development of oxidation catalysts for catalytic converters to comply with the 1975 emission control regulations is described. A systematic and expedient catalyst evaluation system consisting of an activity test (including physical properties), durability test, and reaction conditions test for catalytic oxidation was developed. Intensive studies of the catalytic reaction mechanism were conducted for the efficient application of catalysts. Over 5000 types of catalysts were tested, and the most suitable ones were selected and further modified. Precious metal type pellet catalysts were developed, and the system using these catalysts was adopted as one of the major control devices for exhaust emissions.

54189 **APTIC NO. 78472**

Horiike, Eisuke, Masaaki Murakami, Tatsuya Hosoya, Tsuneo Miyanishi, and Shigenari Amamiya

REMOVAL METHOD OF NITROGEN OXIDES IN THE EXHAUST GAS AND IT S EQUIPMENT. *(Haigasu chu no chisso sankabutsu no jokyo hoho narabini sono sochi). Text in Japanese. (Kyowa Kako Kabushihi Kaisha (Japan)) Japan. Pat. Sho 50-24265. 8p., Aug. 14, 1975. (Appl. June 27, 1972, 2 claims).*

A three-stage removal method for nitrogen oxides is designed for the treatment of NOx produced by surface treatment of metals using nitric acid or decomposition of nitrates. The nitrogen dioxide is absorbed in an aqueous alkali solution (2NO2 + 2NaOH equals NaNO3 + NaNO2 + H2O) in the first stage, the nitric oxide is oxidized to NO2 in alkali hydrogen peroxide solution (pH 12) (NO + H2O2 equals NO2 + H2O) and NO2 produced is simultaneously absorbed in the second stage, and the remaining NO2 is decomposed to nitrogen by reacting with sodium sulfide, sodium hydrosulfide or their mixture (2NO2 + 4Na2S + 4H2O equals 8NaOH + 4S + N2, 2NO2 + 4NaHS equals 4NaOH + 4S + N2) in the third stage. The removal device comprises at least one alkali absorption tower with aqueous alkali solution sprayed and circulated for the first stage, oxidation absorption tower with alkali H2O2 solution sprayed and circulated for the second stage, and decomposition tower with Na2S, NaHS or Na2S + NaHS solution sprayed and circulated for the third stage. The removal rate of NOx is in the range of 94.5-99.6%.

54190 **APTIC NO. 78571**

Huang, C. J. and Charles Dalton

ENERGY RECOVERY FROM SOLID WASTE, (VOLUME 2) (FINAL REPORT). *Houston Univ., Houston, Tex., National Aeronautics and Space Administration Contract NGT-44-005-114, Rept. NASA CR-2526, 242p., April 1975. 200 refs.*

A systems analysis of energy recovery from solid waste demonstrates the feasibility of several current processes for converting solid waste to an energy form. The social, legal, environmental, and political factors are considered in depth with recommendations made in regard to new legislation and policy. Biodegradation and thermal decomposition are considered with emphasis on thermal decomposition. A technical and economic evaluation of a number of available and developing energy recovery processes is given. Based on present technical capabilities, use of prepared solid waste as a fuel supplemental to coal seems to be the most economic process by which to recover energy from solid waste. Markets are considered in detail with suggestions given for improving market conditions and for developing market stability. A decision procedure is given to aid a community in deciding on its options in dealing with solid waste. A new pyrolysis process is suggested. An application of the methods of this study is made to Houston, Texas. (Author abstract)

54191 **APTIC NO. 78710**

Inaba, H.

DENITRIFICATION OF FLUE GASES FROM STATIONARY SOURCES. *(Kotei hasseigen ni okeru NOx bojo gijutsu). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(10):1124-1129, 1975.*

A denitrification system for clean gas is described. A combined denitrification-desulfurization system for dirty gas (containing sulfur oxides), based on selective catalytic reduction using ammonia as reducing agent and catalysts developed by Hitachi Shipbuilding Co., discussed, with flow sheets. Characteristics of the catalyst and catalytic layer are discussed, with test data concerning the clogging of the catalytic layer by dust, catalyst life, catalyst poisoning by SOx, and effects of reaction temperature. The equipment cost for the combined denitrification-desulfurization system with 300,000 N cu m/hr capacity is about $6.6 million, and the operational cost is about $15.00/kl heavy oil. This system can be applied to non-selective or semi-selective catalytic reduction using carbon monoxide, hydrogen or hydrocarbons as reducing agents.

54192 **APTIC NO. 78808**

Inoue, K., M. Udagawa, Y. Iida, and T. Ohira

USE OF REQUIRED EXHAUST GAS REDUCTION DEVICE. *(Gimuka sareta genshosochi no heiyo). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 6:99-112, 1975. 21 refs.*

A combination of an ignition control apparatus and a catalytic converter was examined for its effect on exhaust gas reduction. Three six-cylinder, used cars equipped with the device were run on a chassis dynamometer and part of the exhaust gas was led directly, or through a constant volume sampling apparatus, to a gas analyzer. Results revealed that the carbon monoxide, hydrocarbon (as hexane), and nitric oxide could be reduced from 1.24%, 722 ppm, and 1728 ppm to 0.23%, 373 ppm and 1185 ppm, respectively, at 4-mode running condition and the CO, total HC and NOx from 18.85 g/km, 4.35 g/km and 2.51 g/km to 4.37 g/km, 2.96 g/km and 2.42 g/km, respectively, at 10-mode running condition. Results of the tests for a 6-cylinder, 4-cycle and a 4-cylinder, 4-cycle engines showed that, by employing the ignition control apparatus and the catalytic converter, the torque and the output decreased while the fuel consumption increased at all engine rotation speeds. At full load and engine speed higher than 2500 rpm the engine performance was very poor.

54193 **APTIC NO. 78425**

Ishihara, Yoshimi

STUDIES ON SULFUR OXIDES REMOVAL FROM FLUE GAS BY DRY LIMESTONE INJECTION PROCESS (I)--CONCIDERATIONS ON THE LIMESTONE CALCINATION AND SULFUR DIOXIDE FIXATION IN BOILER FURANCES--. *(Sekkai seki fukikomiho ni yoru haien datsuru ni kenkyu, II, sakkai seki fukikomiho no hatsuden yo boira eno tekiyo to sikkaiseki no netsu bunkai oyobi SO2 kyushu hanno no kosatsu). Text in Japanese. Nenryo Kyohaishi (J. Fuel Soc. Japan) Tokyo, 54(575):169-174, 1975. 15 refs.*

The thermodynamic properties of the dry limestone injection process which involve limestone calcination and sulfur dioxide fixation were determined. Limestones or hydrated limes decompose to calcium oxide above 770 C or 400 C, respectively, when the carbon dioxide and water vapor concentrations are 12 and 10% in flue gases. The reaction of calcium oxide with SO2 occurs below 1250 C when the concentrations of SO2 and oxygen are 0.2 and 3% in flue gas.

54194 **APTIC NO. 78456**

Iwai, Masuo

IMPROVEMENT METHOD FOR COLLECTIVE CHIMNEYS. *(Shugo entotsu no kairyo hoho). Text in Japanese. (Shin-Nihon Iron Manufacturing Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho [illegible]3818, 3p., April 8, 1975. (Appl. July 26, 1971, 1 claim).*

A practical modification method for collective chimneys is described. The advantages of this method is that the modification could be carried out during thee operation of the plant. Also, the high removal efficiency of mist and dust pollutants would be expected in spite of simple structural changes. Two parallel circular plates through which the collective chimneys pass are installed below the top of these chimneys. Wall plates which separate the path of each chimney are installed to create independent chambers. Then the part of chimney in the chamber is cut off and thhe outer wall is welded along the edges of two upper and lower parallel plates. Mist and dust which is collected in the bottom of the chamber is taken away through the pipe which is connected to the bottom of the chamber.

54195 **APTIC NO. 78736**

Jackson, Ronald M.

DESIGN, INSTALLATION, AND OPERATION OF ELECTROSTATIC PRECIPITATORS OF FLUID CATALYTIC CRACKER FLUE GAS APPLICATIONS. *IEEE* (Inst. Elec. Electron. Engrs.) Tran. Ind. Appl., IA-11(2): 236-240, March-April 1975. (Presented at the 1973 IEEE Petroleum and Chemical Industry Conference, Houston, Tex., Sept. 10-12, 1973, Paper TOD-74-55.)*

Electrostatic precipitator design and operation are reviewed, with particular emphasis on installations for removing particulates from fluid catalytic cracker flue gas. Topics discussed include: the electrical theory of precipitator operation, dust resistivity and flue gas conditioning, collection efficiency, power supply design, operating variables, and common precipitator failures. The aluminum silicate catalyst dust from fluid catalytic crackers possesses a resistivity of about 5 times 10 to the 11 ohm-cm, a value at which serious back corona can be expected. The addition of 20 ppm of ammonia to the gas stream is effective in reducing this resistivity to 10 to the 10 ohm-cm, with an accompanying increase in collection efficiency of from 96-99.8%. Ammonia addition is only effective, however, when a large amount of moisture produced by the combustion of coke on the catalyst in the regenerator, is present. The most frequent electrical problem associated with precipitators in catalytic cracker applications is shorted emitter wires and the most downtime is caused by failure of high-voltage components.

54196 APTIC NO. 78885

Kaisersot, K.

USE OF THE WASTE STEAM HEAT OF STEAM POWER PROCESSES BY THE HEAT PUMP. *(Ausnutzung der abdampfwaerme von Dampfkraftprozessen durch die Waermepumpe). Text in German. Brennstoff-Waerme- Kraft, 27(5):219-224, 1975. 7 refs.*

Different possibilities for heat recovery from waste steam in steam power processes by means of a heat pump were analyzed. Heat pumps for waste steam heat recovery behind condensing reheat turbines must be regarded as a unit with the turbine, and consequently can be compared with back-pressure type steam turbines or pass-out condensing turbines. At hot-water temperatures between 60 and 110 C, and under identical environmental conditions, the fuel consumption of a condensing steam turbine - heat pump coupling is by 20-50% greater than that of a back-pressure type steam turbine or pass-out condensing turbine. Heat pumps designed to supply hot water with 110 C require the full power of a condensing steam turbine with 35% efficiency, as in the case of nuclear power plant condensing steam turbines. Since no energy is needed for heating in summer, the waste heat emission to the atmosphere or water bodies cannot be reduced in this season. This thermal pollution can be abated by heat storage during the summer months for winter.

54197 APTIC NO. 78963

Kamio, Shinichi, Osamu Maeda, Yoshihiro Maeda, and Kiyoshi Suzuki

EFFECT OF FUEL-JET RETARDATION ON DIESEL ENGINE. *(Diizeru enjin ni taisuru nenryo funsha jiki chien no eikyo). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 511-517, 1975. (Presented at the Society of Automotive Engineers of Japan Inc. Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

Effects of injection timing retardation for controlling nitrogen oxides emission on engine performance, exhaust gas emission (black gas), deterioration of engine oil, soiling of the engine interior, and abrasion of engine parts were investigated by bench endurance tests using direct injection (DI) and swirl- chamber (SC) engines. The reduction rate of NOx by six deg retardation was 30% for DI and 18% for SC, while the smoke emission increased markedly with DI and decreased slightly with SC. The reduction in output was 6% for DI and 14% for SC. The deterioration of engine oil increased with retardation regardless of the type of engine. Ranges of retardation studied were three deg for DI and six deg for SC. The soiling and deterioration of the engine interior are also increased by retardation, but can be controlled by the use of high quality oil. Scuffing and abrasion in the upper part of the cylinder liner were observed with DI and were attributed to increased soot in blowby gas, and to high thermal load.

54198 APTIC NO. 78967

Kaneko, Yasuo, Tsuneo Ohigami, and Akio Saito

EFFECTS OF AIR-FUEL RATIO, IGNITION TIMING, EGR, AND COMPRESSION RATIO ON EXHAUST EMISSION AND FUEL COST. *(Kunenhi, tenkajiki, EGR, oyobi asshukuhi ga haiki emisshion to nenpi ni oyobosu eikyo). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 629-632, 1975. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

Effects of air-fuel ratio, ignition timing, exhaust gas recirculation, and compression ratio on exhaust emission and fuel cost were investigated using a single cylinder engine. For the reduction of nitrogen oxides emission, the EGR provides better fuel economy compared to the method of reducing air-fuel ratio or retarding ignition timing. In a certain range of EGR rate, fuel cost can be reduced slightly. The increase in compression ratio is effective for the reduction of fuel cost; however, hydrocarbon emission is increased. The HC level can be reduced by retarding the ignition timing, but this is accompanied by an increase in fuel cost, particularly at high load. The HC level increases with the reduction in air-fuel ratio and also with EGR; however, it can be reduced by retarding the ignition timing. For reduction of NOx emission with maximum fuel economy, the combination of EGR at low air-fuel ratio, ignition timing at MBT, and high compression ratio is most desirable.

54199 APTIC NO. 78693

Karlovsky, Jerry, Jr.

ENGINEERING CRITERIA FOR SELECTING DIESEL- OR ELECTRIC-POWERED EQUIPMENT FOR UNDERGROUND MINING APPLICATION. *Bureau of Mines Information Circ., vol. 8666:125-138, 1975. (Presented at the Symposium on the Use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)*

Servicing and maintenance guidelines for controlling pollutants from diesel equipment used in underground mines are presented. Timing and fuel-injection setting are important on underground diesel-powered equipment and must only be performed by authorized personnel when adjustments are necessary. The mine air must be checked during each shift for toxic gases. Sampling details will be established in the Code of Federal Regulations. Frequency of cleaning or change of intake air filter depends on the length of its operation and amount of dust in the section. Fuel must be clean and free of contaminants. Storage and handling of diesel fuel underground is under strict regulations.

54200 APTIC NO. 78469

Kawaguchi, Katsuyuki

GAS TURBINE COMBUSTION EQUIPMENT. *(Gasu tabin nensho sochi). Text in Japanese. (Mitsubishi Heavy Industries, Ltd., (Japan)) Japan. Model Util. Sho. 50-20162. 3p., June 19, 1975. (Appl. April 21, 1971, 1 claim).*

A smoke level control device that operates by means of injecting pressurized fluid or air into the primary combustion region was designed for a gas turbine smokeless combustor. To provide oxygen necessary for complete combustion in the vicinity of the fuel injection cone, a baffle vane with many small injection ports is extended around the fuel injection cone at an angle. The pressurized air or fluid is injected evenly from the supercharger through the supercharged fluid distributor. The difference between the combustor pressure and supercharger pressure is maintained at 1-2 kg/sq cm. The smoke level can be reduced to B.S.N. 2.

54201 APTIC NO. 78470

Kirn, Herbert

SYSTEMS OF ECONOMIC USE OF ENERGY AND ENERGY RECOVERY. *(Systeme der rationellen Energienutzung und Energierueckgewinnung). Text in German. Elektrizitaetswirtschaft, 74(5):126-129, 1975. 7 refs.*

Systems for the economic use and recovery of thermal energy as a means of fuel economy and environmental protection are described. Seventy-six per cent of the total energy used in West Germany is used in the form of thermal energy, including 40% for space heating, and 36% process heat. The yearly fuel consumption for space heating can be reduced by 25-40% by efficient heat insulation. Different types of heat exchangers are available for heat recovery from hot water, wastewater, air, and waste gases. Heat insulation combined with efficient heat recovery by means of heat pumps permits economical space heating both in living quarters and in offices and work areas. Heat exchangers for aggressive gases should be made of corrosion-proof materials, e.g., glass.

54202 **APTIC NO. 78814**

Kisters, T.

FLUE GAS CLEANING BEHIND REFUSE INCINERATING PLANTS - PROBLEMS AND THEIR SOLUTIONS. *(Rauchgasreinigung hinter abfallverbrennungsanlangen - Probleme und Loesungsmoeglichkeiten). Text in German. Aufbereitungs-Technik, 16(5):231-236, May 1975.*

Techniques and equipment for flue gas cleaning behind waste incinerators are described. The incinerator flue gases usually contain 5-15 g dust, 1000-2000 mg hydrochloric acid, and up to 20 mg hydrofluoric acid per N cu m. The maximum allowable emission concentrations are 100 mg/N cu m for dust and chlorine, and 5 mg/N cu m for fluorine. Suspended matter can be separated most efficiently and economically in electrostatic dust separators which require preliminary flue gas cooling because they can not be operated permanently at temperatures over 300 C. Sulfur dioxide, HCl and HF can be separated by wet absorption or adsorption methods, using water, aqueous solutions of calcium hydroxide or sodium hydroxide, or limestone. Limestone is used most efficiently in fluidized-bed operations. The admission of pulverized limestone into the flue gas is less efficient. The gases require cooling before, and heating after the wet separation of gaseous components.

54203 **APTIC NO. 78695**

Knoerzer, J. J.

PREHEATING AND PIEPLINE CHARGING OF HIGH ILLINOIS COAL BLENDS FOR BYPRODUCT COKING. *Trans. Soc. Mining Engrs. AIME, 258(1):42-46, March 1975. (Presented at the Society of Mechanical Engineers Fall Meeting, Pittsburgh, Pa., Sept. 1973, Paper 73F349.)*

The feasibility of producing high grade metallurgical coke from preheated blends containing more than 60% Illinois No. 6 coal was investigated. A full scale operation test was conducted on a Coaktek preheating and pipeline charging system. The coke has similar physical characteristics as compared to conventional wet charged coke, with the exception of smaller size for the preheat coke. Smoke and dust air pollution during chargings is controlled and there are no serious operating problems. The coking time is reduced 25% from normal 17 hr for wet charging to 12.8 hr for preheated charges. The blast furnace performance with preheat coke is satisfactory. (Author abstract modified)

54204 **APTIC NO. 78982**

Kobe, Ryuzo

AN AIR CLEANER. *(Kuki seijyoki). Text in Japanese. (Tamachi Electric Industry Co., Ltd. (Japan)) Japan. Model Util. Sho 50-10446. 5p., April 2, 1975. 1 ref. (Appl. Feb. 12, 1968, 1 claim).*

A large capacity air cleaner with simple structure was developed. The large cleaning capacity was obtained by reducing fluid resistance in the equipment and by introducing an efficient active gas absorbent. The system consists of an inlet for polluted air, blower fan, resin fiber filter which was treated with gas absorbent solution, and an outlet for cleaned air. The system can be hung on the wall for convenient use. The absorbent is a mixture of 1000 parts 2% DVA solution, 100 parts glycerol, 50 parts sulfonic acid ester, 20 parts calcium hydroxide, and 30 parts manganese dioxide. Cleaning efficiency in the range 90-100% lasts for 500 hours for air which contains 10 ppm sulfur dioxide gas with a flow rate of 1.5 cu m/min through 1200 cu cm of filter cross section and 3 cm thickness.

54205 **APTIC NO. 78835**

Koehler, George R. and Klaus Leikert

A NEW METHOD FOR FLUE GAS DESULFURIZATION. *(Ein neues Verfahren zur Rauchgasentschwefelung). Text in German. Energie (Munich), 27(5):134-137, 1975.*

A new method for flue gas desulfurization in power plants is described, and preliminary results obtained in EPA-sponsored demonstration runs in the USA are reported. The power plant flue gases are washed with a water spray containing magnesia in solution. A high degree of desulfurization is achieved in a single-step operation due to the fine distribution of the spray and the great affinity of magnesium oxide for sulfur dioxide. After droplet separation and heat-up, the cleaned flue gases are discharged into the atmosphere. The sludge containing magnesium sulfite and a small quantity of magnesium sulfate is thickened and dried, after which the magnesium sulfate and sulfite are reduced to MgO for recirculation within the desulfurization process. A rotary calcining kiln is used for the recovery of MgO. The gas containing about 10% SO2 is dedusted and used to obtain sulfuric acid, sulfurous acid, or elemental sulfur. A demonstration plant operation in the USA revealed desulfurization efficiencies in excess of 90%.

54206 **APTIC NO. 78942**

Kokubo, Ryo, Koji Yokomichi, Yasuo Takakuwa, and Kozo Takahashi

RECOVERING METHOD OF MELAMINE WASTE GAS. *(Meramin hai gasu kaishu no). Text in Japanese. (Nissan Chemical Industries, Ltd. (Japan)) Japan. Pat. Sho 50-22020. 5p., July 28, 1975. 1 ref. (Appl. Nov. 1, 1969, 1 claim).*

A method for the recovery of melamine waste gas in melamine manufacturing is described. Melamine waste gas consisting of 16.4 kg/hr of ammonia and 10.6 kg/hr of carbon dioxide at 200 C was released from a high pressure reactor in which 10 kg/hr of melamine was prepared from 29 kg/hr of urea and 8.2 kg/hr of ammonia at 400 C and 140 kg/sq cm. The waste gas was led to another pressure reactor in which a mixture containing 7.2 kg/hr of urea, 12.3 kg/hr of NH3, 5.3 kg/hr of CO2 and 2.2 kg/hr of water was prepared from the waste gas at 150 C and 135 kg/sq cm. The mixture was introduced to an ammonia recovering tower where ammonia was recovered at 4 kg/hr.

54207 **APTIC NO. 78610**

Kummer, J. T.

AUTOMOTIVE EMISSION CONTROL BY CATALYTIC CONVERTERS. *Preprint, Ford Motor Co., Dearborn, Mich., Scientific Research Staff, 18p., 1975. 28 refs.*

The types of catalyst systems for automobile exhaust emissions are briefly described. Generally the unit consists of the catalyst proper on a refractory support. Carbon monoxide and hydrocarbons are catalytically oxidized to carbon dioxide and water. The catalytic activity of base metal oxides for the oxidation of hydrocarbons and CO is lower than the noble metals. The catalytic activity of present catalysts is insufficient to dispense with spark retard for CO and hydrocarbon control to meet emission standards. Nitric oxide is reduced with either CO or hydrogen to given nitrogen and either carbon dioxide or water. This requires that the vehicle be operated stoichiometrically rich to produce a reducing atmosphere, and that air be injected after the NO reduction catalyst so that the exhaust gas can be passed over a CO and hydrocarbon oxidation catalyst. The NO reduction catalyst must operate in an oxidizing mode during cold start when large amounts of CO are produced. Noble metals are often used in NO reduction catalysts to produce some resistance to sulfur poisoning under the reduction conditions used. If the air-fuel ratio can be kept near the stoichiometric point during all modes of operation, both NO reduction and CO and hydrocarbon oxidation can be done in one catalyst bed. The NO reduction decreases at larger air-fuel ratios and removal of CO and hydrocarbons decreases at smaller ratios. The principal problem is durability, which is controlled by the high temperature of operation and the presence of catalyst poisons in the exhaust stream. (Author abstract modified)

54208 **APTIC NO. 78676**

Laabs, K. Dietrich

SYSTEMS ENGINEERING INVOLVED IN HEAT RECOVERY. *(Anlagentechnik der Waermerueckgewinnung). Text in German. Heizung Lueftung Haustech., 26(2):52-55, 1975. (Presented at the Energy Savings in Building Construction Symposium, Hanover, West Germany, Nov. 6, 1974.)*

The very high import ratio of primary energy, and the increased price of energy carriers in West Germany call for an increased use of heat recovery in buildings. Through the analyses of different heat recovery possibilities, systems engineering should provide an optimal heat recovery system at the planning stage of construction projects. Heat pumps, which are capable of recovering also the latent heat of the waste air to be discharged, are usually most efficient. According to the latest rules concerning contacts on building projects, only bids considering economical heat supply are acceptable.

54209 **APTIC NO. 78703**

Mahnkopf, Guenter

GAS BOILERS FOR CENTRAL HEATING. *(Gaskessel fuer Heizzentralen). Text in German. Wasserfach, Gas/Erdgas (Munich), 116(4):151-155, 1975.*

The technical, environmental, and economical advantages of gas boilers for central heating are discussed. Gas boilers are equally advantageous for family homes and large buildings. Compared with other fossil fuels, natural gas represents the best fuel hygienically because it generates only small quantities of air pollutants on combustion. The nitrogen oxides emissions are usually lower than for other fuels. The high price of fuel stimulates high-quality heat insulation to save heating costs. Central heating boilers designed for natural gas and oil should deliver the base load with natural gas, and fuel oil should be used as a secondary fuel only.

54210 **APTIC NO. 78720**

Mallek, Heinz

INCINERATION. NOVEL CONSTRUCTION WITH CLEAN FLUE GAS. *(Muellverbrennung. Neukonstruktion mit sauberem Rauchgas). Text in German. Umwelt (Duesseldorf), vol. 3:44-45, June 1975.*

A new waste incinerator designed by Kernforschungsanlage Juelich (Juelich Nuclear Research Center) for radioactive wastes from medical and other institutions at a capacity of 50 kg/hr is described. The wastes are incinerated in a reciprocating type combustion chamber at 800 C, after which the hot flue gases are led through vertical, temperature-resistant filter mats for the separation of suspended matter and for final oxidation in an afterburning chamber at 1000 C. The ashes accumulating on the filter mats drop off into an ash collector. The incinerator achieves a high degree of volume reduction. The dust concentration in the discharged flue gases is below 50 mg/N cu m, and the carbon monoxide content is about 0.01%. The filter mats have a minimum service life of 1000 hr.

54211 **APTIC NO. 78843**

Masai, Tadahisa

LINER STRUCTURE OF GAS TURBINE BURNER. *(Gasu tabin nenshoki no raina kozo). Text in Japanese. (Hitachi, Ltd. (Japan)) Japan. Pat. Sho 50-25087. 6p., Aug. 21, 1975. 2 refs. (Appl. April 10, 1972, 1 claim).*

A new liner structure for gas turbine provides better performance. Louvres of different direction were added near the secondary air holes. The louvres diverted the liner cool air, resulting in an increase of the penetration distance of the secondary air. The louvres also created liner circulation flow which increased the combustion flow in the primary combustion region near the upstream of the secondary air flow. The air-fuel ratio in the primary combustion region was increased and the liner circulation flow was heated, resulting in the reduction of the release of unburned hydrocarbons. The increase of the liner circulation flow also resulted in the improvement of the ignition characteristics of the gas turbine. The device could be used to obtain satisfactory combustion conditions using low quality fuel.

54212 **APTIC NO. 78878**

Matsuda, Toshiro

RECONSTRUCTION AND REPAIR OF STACK GAS DESULFURIZATION INSTALLATION. *(Haien datsuryu sochi no kaizo oyobi hoshu). Text in Japanese. Karyoku Genshiryoku Hatsuden (Therm. Nucl. Power), 26(8):829-836, Aug. 1975.*

The reconstruction and repair of a stack gas desulfurization installation at Ishimaki Factory of Jujo Paper Co., Japan, is described. This desulfurization installation converts sulfur dioxide to sodium sulfite, which is further used in pulp manufacturing processes. The desulfurization installation treats 110,000 N cu m/hr of gas. Concentration of SO2 is reduced from 811.5 ppm at the inlet to the absorption tower, to 68 ppm (actual concentrations, 20-30 ppm) at the outlet. The installation was put into operation in August 1972, with 96% initial efficiency. Corrosion problems occurred in the U-shaped duct leading to the venturi tube by September 1972, and repairwork became necessary every few months thereafter. In August 1974, a redesigned U-shaped duct was installed, and internal inspection in January 1975 revealed no defects. The new U-shaped duct is double-walled, with coolant water (1.5-2 t/H) circulating within the jacket to cool externally the hard lead lining. To prevent corrosion of the spray nozzle assembly, the ring section is outside the duct, while the nozzle is installed inside. The nozzle is made of SUS 316, and the nozzle tube is coated on the outside with lead. Nozzle tubes can be replaced from the outside during operations. A 90-deg bend in the duct was modified to 60 deg, and insulated to maintain gas temperatures sufficiently high to retard formation of sulfuric acid.

54213 **APTIC NO. 78461**

Miki, Takao

EXHAUST GAS PURIFYING FACILITY OF INTERNAL COMBUSTION ENGINE. *(Nainen kikan no haiki gasu joka sochi). Text in Japanese. (Mitsubishi Electric Co., Ltd., Himeji (Japan)) Japan. Model Util. Sho 50-20209. 2p., June 19, 1975. 1 ref. (Appl. July 14, 1970).*

An ignition-timing control device for an automobile equipped with a catalytic converter is described. The exhaust gas temperature sensor senses the temperature within the catalytic converter, and it regulates the ignition-timing at the distributor. The distributor has two-way circuits; a delayed ignition circuit and a normal ignition circuit. When the exhaust gas temperature is within a certain temperature, the temperature sensor connects the ignition circuit to the delayed one, reducing the harmful components in the exhaust gas. The catalytic converter further reduces the harmful components. When the automobile operates at high speed, the exhaust gas temperature increases at the delayed ignition circuit, while the amount of harmful components in the exhaust gas is still small. Whenever the exhaust gas temperature is high, the temperature sensor regulates the ignition circuit to the normal ignition circuit, making the exhaust gas temperature lower. Under this normal ignition timing, the harmful components in the exhaust gas increase. However they could be cleaned by catalytic converter, since the exhaust gas temperature was within the permissible temperature range of catalyst functioning.

54214 **APTIC NO. 78951**

Miyoshi, Noritaka, Shigeru Tsutsumi, and Noboru Sonoda

DESULFURIZATION OF COKE USING SODIUM HYDROXIDE UNDER IRRADIATION OF MICROWAVE. *Osaka Daigaku Kogaku Hokoku (Technol. Rep. Osaka Univ.), 25(1230-1253):241-247, March 1975. 6 refs.*

A process for the desulfurization of coke using sodium hydroxide under microwave irradiation is described. Desulfurization occurs by the irradiation and is promoted by addition of alkali, polyethylene, or water to the coke in the reactor under hydrogen atmosphere. The sulfur removal increases with an increase in the amount of alkali added. A 95% S removal is achieved when the irradiation of microwave is undertaken using hydrogen as the carrier gas at a weight ratio of 0.2 alkali/coke. The addition of polyethylene to the reaction system is effective for desulfurization. Simultaneous use of alkali and water under nitrogen steam promotes S removal. (Author abstract modified)

54215 **APTIC NO. 78709**

Morita, Tomijiro

SODIUM SULFATE PROCESS FOR SULFUR DIOXIDE REMOVAL. *(Aryusoho haien datsuryo ni tsuite). Text in Japanese. Kami-Pa Gikyoshi (J. Japan. Tech. Assoc. Pulp Paper Ind.), 29(10):527-532, Oct. 1975. 4 refs.*

A desulfurization by sodium sulfite process developed by Kureha Chemical is described. The sulfur dioxide is absorbed in sodium hydroxide solution and removed as Na2SO3. The Na2SO3 process is classified into the crystalline recovery method, solution recovery method, and solution discharge method (discharged as Glauber s salt after the oxidation process). The desulfurization product recovered consists of 93.1% Na2SO3, 6.7% sodium sulfate and others, and therefore the purity of Na2SO3 product is about 90%. The materials used for a large-scale desulfurization system, and problems of corrosion and safety in operation of a closed system are discussed. The cost of the crystalline recovery method was $3.00-$11.00 per kl of heavy oil, depending on the scale of the desulfurization system.

54216 **APTIC NO. 78711**

Morita, Y. and M. Takayasu

CATALYTIC REMOVAL METHOD FOR NOX IN FLUE GAS FROM SINTERING PLANT BY THE DRY METHOD. *(Kanshikiho ni yoru shoketsuro haigasu chu no NOx jokyoho). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(10):1117-1123, 1975. 19 refs.*

Denitrification based on catalytic reduction using ammonia as the reducing agent, and the catalytic oxidation of nitric oxide to nitrogen dioxide followed by the absorption of NO2 are discussed. Basic studies on the development of catalysts specifically designed for the denitrification of flue gas from sintering furnaces were conducted. Effects of oxygen (10%), sulfur dioxide (300-500 ppm) and water (10%) on the reduction of NO by NH3 and on the catalytic oxidation of NO were investigated. In the case of catalytic reduction, conversion rates of NO using copper, vanadium, chromium, iron, molybdenum and Cu-Cr carried on alumina were 70.0-90.2% in a NO-NH3-O2 system, 76.1-89.8% in a NO-NH3-O2-SO2 system and 61.9-82.8% in a NO-NH3-O2-SO2-H2O system. Manganese, cobalt and Cr oxides, and platinum carried on alumina showed high catalytic activity, but no one catalyst was found to be effective in the presence of SO2, H2O and carbon monoxide. The simultaneous denitrification and desulfurization electron ray irradiation method, NH3-activated carbon method, and NH3 reduction without the use of catalysts are also discussed. The PARANOX Process developed by Nippon Kihatsuyu and Shell Kosan and the KNORCA Process developed by Kurashiki Boseki are also described.

54217 **APTIC NO. 78796**

Moss, G. and P. J. Agius

THE DESULPHURISATION OF FOSSIL FUELS DURING COMBUSTION IN FLUIDISED BEDS OF LIME PARTICLES. *Preprint. World Petroleum Congress, Japanese Organizing Committee, 10p., 1975. 15 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

The desulfurization of fossil fuels during combustion in fluidized beds of lime particles is described. Fossil fuels are desulfurized at high temperature under both full and partial combustion conditions. Low sulfur oxide emissions are achieved using high sulfur fuels. Other pollutants such as nitrogen oxides and heavy metals are reduced. Full combustion requires construction of new fluid bed boilers, but partial combustion units can be added to existing boilers. Both processes are proven in pilot plants. Demonstration units are planned. Both systems are competitive in cost with other desulfurization processes. (Author abstract modified)

54218 **APTIC NO. 78845**

Muraki, R.

PROJECT ON WET TYPE FLUE GAS DESULFURIZATION APPARATUS. *(Shisshiki haien datsuryu sochi no keikaku). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(3):218, March 1975.*

A general discussion is given on wet type flue gas desulfurization including the reagents used and the products recovered. The absorbents used in desulfurization usually are those with high solubility, low vapor pressure, little corrosive action, low viscosity, non-toxic, non-flammable, and low cost. These include sodium hydroxide, potassium hydroxide, calcium hydroxide, liquid ammonia, magnesium oxide, sodium carbonate, and calcium carbonate. The sulfur dioxide is recovered as sodium sulfite, sodium sulfate, ammonium sulfate, sulfuric acid, gypsum and sulfur, depending on the reagent used. Approximately 18,000 kl of liquid and gas fuel including 1980 kl of high sulfur content oil (more than 3.75%) were consumed in Japan in 1973. Plans were made to redistribute fuel to reduce high SO2 emission in certain areas.

54219 **APTIC NO. 78881**

Murr, J.

GOOD EXPERIENCE WITH ADDITIVES. EFFECT OF ADDITIVES. *(Gute Erfahrungen mit Additiven und Feuerungszusaetzen, Wirkungsweise der Additive). Text in German. Sanit. Heizungstech., 40(3): 190-193, 1975.*

Requirements on and effects of fuel oil additive on corrosion, the combustion process, and on air pollutant emissions are outlined. Stable and uniform flame, and consequently more complete combustion can be achieved by means of additives which improve the fuel oil atomization and provide for a more homogeneous droplet size distribution. Compact and stable flame generates less sulfur trioxide. Better atomization and increased rate of evaporation of the fuel oil droplet, brought about by surface-active additives, result in a reduction of oil coke and soot formation. The improved combustion makes it also possible to reduce the air excess coefficient, which results in a reduced heat loss through reduced flue gas volume. Certain additive components loosen up and promote the combustion of oil coke coating the heat exchanger surfaces, and thereby increase heat transfer to the medium to be heated. The reduced air excess coefficient leads to a decrease in the amount of sulfur trioxide and nitrogen oxides generated, especially in combustion equipment operated at high temperature.

54220 **APTIC NO. 78980**

Nagaishi, Isao, Yasuo Hyobara, Tadahiro Azuma, Fumio T ujimoto, Kaoru Sato, and Hiroshi Tomoto

DEVELOPMENT OF LOW NOX BURNER (PART 2). *(Tei NOx bana no kaihatsu -2). Text in Japanese. Preprint, Osaka Prefectural Industrial Research Inst., p. 27-28, 1975. (Presented at the Osaka Prefectural Industrial Research Institute, Study Meeting, Osaka, Japan, 1975.)*

A low nitrogen oxides burner was studied. A correlation between the distribution of the temperature and the NOx concentration in the flame of the burner was found; lower temperatures in the flame depress the concentration of NOx. In the previous test experiment of a two-stage combustion burner, because of a local temperature region in the second combustion flame 75 ppm of NOx was the lowest concentration. In order to disperse such a local high temperature region, a flame divider was installed on the two-stage combustion urner. The NOx concentration was thus reduced to 50 ppm.

54221 **APTIC NO. 78459**

Nakajima, Yasuo and Takeharu Oguri

AN EXHAUST GAS PURIFIER FOR AN INTERNAL COMBUSTION ENGINE. *(Nainen kikan no haiki gasu joka sochi). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-20182. 2p., June 19, 1975. 1 ref. (Appl. June 4, 1970).*

An improved flow structure of exhaust gas for an automotive exhaust system equipped with a catalytic converter is described. The system eliminates the conventional by-passing exhaust pipe. The catalytic converter is cased and attached to the exhaust pipe. The casing is divided into two compartments to accommodate different kinds of catalyst. The exhaust gas in the exhaust pipe enters one of the rooms, then passes to the second room, and returns to the exhaust pipe. A flow control valve on the exhaust pipe controls the amount of exhaust gas flow to the catalytic converter. Whenever the temperature and amount of exhaust gas exceeds the catalytic converter capacity, the exhaust gas can bypass the catalytic converter without employing a bypassing pipe.

54222 **APTIC NO. 78930**

Nakamura, Y. and K. Mori

PREVENTION OF VOLATILE SUBSTANCES IN THE VULCANIZATION OF EPICHLOROHYDRIN-ETHYLENE OXIDE RUBBER. *(Epikuroruhidorin-echirenokishido kyojugo gomu no karyudoki ni hassei suru kihatsubutsu no yokusei hoho). Text in Japanese. Nihon gomu Kyokai-shi (J. Soc. Rubber Ind. Jap.), 48(9):591-594, Sept. 1975.*

Epichlorohydrin-ethylene oxide copolymer roll-blended with carbon black and vulcanizing accelerator was heated in a test-tube sealed with silicone rubber at 160 C on an oil bath. The resulting gas was sampled with a syringe and was analyzed by gas chromatography with flame ionization detector. The column was a 3 m steel tube packed with 15 wt% polyethylene glycol 1000, and nitrogen at 30 ml/min was used as carrier gas. Six of the nine substances appearing in the gas chromatogram were identified as propylene, methyl chloride, acetaldehyde, allyl chloride, acetone, and methanol, with acetaldehyde having the highest concentration. The quantity of each substance increased with increasing time of roll-blending. No noticeable effect was observed when a free radical scavenger such as t-butylhydroquinone was added. Hydrogen sulfide was detected in addition to the six compounds when 2-mercaptoimidazoline and red lead or 2-anilino-4,6-dithiol-s-triazine and potassium carbonate were used as the vulcanizing accelerator. The formation of hydrogen sulfide was prevented by substituting the 2-anilino-4,6-dithiol-s-triazine and potassium carbonate with a sodium salt of the triazine derivative. The formations of acetaldehyde and the chlorinated compounds could also be prevented by the addition of ethyleneurea or fatty amides.

54223 **APTIC NO. 78837**

Neuhaus, G. E.

DEDUSTING THE WASTE GASES ORIGINATING FROM REFUSE INCINERATING PLANTS. *(Die Entstaubung der Abgase aus Muellverbrennungsanlagen). Text in German. Aufbereitungs-Technik, 16(5):241-244, May 1975.*

Different types of dust separators and their suitability for dust separation from waste incinerator plant-generated flue gases are described with respect to the Technical Regulations for Preventing Air Pollution issued on August 28, 1974 in West Germany. The hot flue gases must be cooled by means of heat exchangers, economizers, or by the admission of fresh air before dedusting. Cyclones and multicyclones are usually unable to satisfy the the new stricter requirements. Therefore, they are not suitable for large-capacity waste incinerators with high dust emissions. Wet type dust separators, such as venturi scrubbers, are suitable for the simultaneous separation of dust and water-soluble gaseous components. Cloth filters, certain types of which can be used up to 200 C, are especially suitable for the separation of particles in the submicron range. High-efficiency electrostatic precipitators can be used economically for a minimum flue gas throughput of 30,000-50,000 cu m/hr.

54224 **APTIC NO. 78863**

Nishida, K., T. Tsuji, T. Honda, and T. Shimizu

OFFENSIVE ODOR OCCURRENCE IN THE LOW TEMPERATURE THERMAL TREATMENT OF SEQAGE SLUDGE AND ITS REMOVING METHOD. *(Gesui odei no teion netsu shori ni okeru hassei shuki to sono jokyo). Text in Japanese. Akushu no Kenkyu (Odor Control Assoc. J.), 4(20):31-49, May 1975. 11 refs.*

Descriptions and test results of a deodorization process for decomposition products of sewage sludge by low temperature thermal treatment, conducted at a test plant in April and May 1974, are given. Gaseous decomposition products from a thermal treatment system (sludge treatment capacity 1.0 cu m/hr, decompositon temperature 135-165 C, flow rate of gaseous decomposition product 13.5-15 cu m/hr) were treated by the water-scrubbing method (effective capacity 0.45 cu m, flow rate 8-10 l/min) and direct combustion method (effective capacity 0.5 cu m, kerosene 9-10 l/hr, furnace temperature 730-880 C). Components of gaseous products before and after the treatments were determined. Among five malodorants, ammonia and hydrogen sulfide were reduced sufficiently to comply with emission standards; however, the trimethyamine level was two times the maximum level after the water-scrubbing and 10 times after the combustion process. Results of gas chromatographic analysis indicated the presence of more than 22-24 organic components, of which 4-7 were removed almost completely by the water-scrubbing. The total hydrocarbon concentration was 200-1500 ppm; 75% was removed by water- scrubbing and 90% by thermal treatment.

54225 **APTIC NO. 78810**

Nishizawa, H.

EQUIPMENT FOR PREVENTING THE EMISSION OF HYDROCARBONS: A METHOD OF RECOVERING USING HEAVY ABSORBENT. *(Tanka suiso haishutsu boshi setsubi: Jyushitsu kyunyu eki ni yoru kaishu hoho). Text in Japanese. Aromatikkusu (Aromatics), 27(6):297-299, June 1975. 2 refs.*

A general discussion is given on the recovery of benzene vapor using heavy absorbent. Benzene vapor is usually led to an absorption tower to which lean oil is introduced as absorbent. The rich oil is pumped from the bottom of the tower to a dispersion tower through a heat exchanger where it exchanges heat with the lean oil from the dispersion tower. Clean air is released from the top of the absorption tower while the benzene is recovered from the top of the dispersion tower. Major factors for selecting an absorbent are its boiling point, cost and toxicity. Aromatic compounds with 8 to 9 carbons are ideal for recovering benzene. The safety measures usually applied include homogeneous and thorough dilution of the released gas by air and use of flame arresters at important points.

54226 **APTIC NO. 78753**

Northrup, Harold J. and William F. Turner

AIR POLLUTION CONTROL IN TEXTILE FINISHING. *Tex. Chem. Color., 7(4):22/60-22/64, April 1975. 15 refs.*

Methods for maintaining acceptable air quality within textile finishing plants are summarized. Some textile operations produce objectionable odors or visible smokes. Specific problem areas include the heatsetting of some synthetic fabrics, fabric printing, the use of dye carriers, and the resin finishing of fabrics. Pollution abatement is achieved by various control devices or by substitution of chemicals or change of process. The quality of air within a plant is maintained by avoiding inplant release of air pollutions and by adequate ventilation. Methods are given for predicting the concentration of pollutants in stack emissions from a proposed new finishing process. The feasibility and economic return from combined heat recovery pollution control procedures are examined. (Author abstract modified)

54227 **APTIC NO. 78869**

Ochs, H. J.

INPUT AIR CLEANING FOR AIR SEPARATION PLANTS. *(Zuluftreiningung fuer Luftzerlegungsanlagen). Text in German. Metall (Berlin), 29(6):591-593, 1975.*

Techniques and equipment for dust separation from air for the purpose of cryogenic air separation are described. Particles slightly smaller than 1 micron and over must be separated from the air for the safe operation of the air separating equipment. Wetted metallic air filters used for the separation of coarse and fine particle fractions have the disadvantages of susceptibility to load fluctuations, and the entrainment of vapors of the mineral oil-base wetting agent into the air separating equipment. In addition, they must be cleaned thoroughly and frequently. Therefore, such filters are increasingly replaced by fiber filters. The finest fractions can be separated by mats of very thin fibers. Electrostatic precipitators, possibly equipped with a high-quality fiber filter behind them, have a very high efficiency for a broad particle size spectrum ranging from about 50 to 0.1 micron.

54228 **APTIC NO. 78699**

Ohkubo, Akira and Sakuji Arai

INTERNAL COMBUSTION ENGINE. *(Nainen kikan). Text in Japanese. (Honda Motor Co., Ltd. (Japan)) Japan. Pat. Sho 50-25084. 3p., Aug. 21, 1975. 3 refs. (Appl. May 8, 1972, 1 claim).*

The internal combustion engine designed has a main combustion chamber with main intake valve and main exhaust valve and an auxiliary combustion chamber with auxiliary intake valve and ignition plug. The auxiliary combustion chamber, located on the head of the main combustion chamber, is connected to the main combustion chamber between the intake valve and the exhaust valve, with an opening that slants toward the intake valve. The flame in the auxiliary combustion chamber, where the fuel mixture with higher fuel-air ratio is ignited, is injected through the opening into the main combustion chamber where the fuel mixture with lower fuel-air ratio is ignited. Thus, the over-all fuel-air ratio can be maintained lower than the theoretical fuel-air ratio.

54229 **APTIC NO. 78907**

Ono, Y., S. Sato, T. Kawasaki, Y. Oka, and N. Ohashi

HEAT RESISTANT STAINLESS STEELS FOR AUTOMOTIVE EXHAUST GAS CLEAN UP SYSTEMS. *(Jidosha haiki hyoka sochi yo tainetsu stenresu ko). Text in Japanese. Kawasaki Giho (Kawasaki Tech. Rev.), 7(1):21-39, Jan. 1975. 19 refs.*

Automotive exhaust gas cleaning devices, thermal reactors, afterburners, catalytic converters, and exhaust gas recirculation were reviewed from the standpoint of their requirements for stainless steel materials. Commercial austenitic and ferritic stainless steels were evaluated by the cyclic heating test. Test data on the mechanical properties, forming properties, welding properties, and oxidation resistance of stainless steels marketed or under development by the Kawasaki Steel Co. are given. Twenty-five percent CR--20% Ni steel resists cyclic heating at temperatures up to 1000 C, and the resistance is elevated to 1100 C by the addition of 20% Cr--10% Ni--3% Si--Ti--R.E.M. two-phase steel withstands cyclic heating up to 1100 C. Extra low carbon 5-18% Cr--2-3% Al--R.E.M. and/or Ti steels show excellent oxidation resistance up to 1100 C and good mechanical and forming properties. These steels are suitable for thermal reactor cores. Extra low carbon 17%--Ti steel (RIVER LITE 430LT) shows good forming and welding properties, resists cyclic heating up to 900 C, and is suitable for use in catalytic converter cores.

54230 **APTIC NO. 78663**

Ozaki, Hiromi, Yoshihito Satomi, and Toshiaki Hisamitsu

THE KINETICS AND ECONOMICS OF HYDRODESULFURIZING RESIDUAL FUEL OILS. *Preprint, World Petroleum Congress, Japanese Organizing Committee, Tokyo, 9p., 1975. 21 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, 1975.)*

A commercial residual oil desulfurizer was used to investigate the apparent order of hydrodesulfurization reactions of residual oils. The reaction order decreases with a rise in reaction temperature. Fairly good predicted aging curves of the catalyst were obtained by applying the new reaction rate equation of nth order to the estimation of catalyst life. A steep rise in the manufacturing expense of fuel oils with a decrease of the sulfur content in the product is recognized, especially at the high desulfurization level. The total manufacturing cost is considerably influenced by the catalyst life. The development of a catalyst of higher desulfurizing selectivity would lower the manufacturing cost. The fuel cost has a powerful effect upon the manufacturing cost. (Author abstract modified)

54231 **APTIC NO. 78828**

Rothwell, E.

FABRIC DUST FILTRATION. *Chem. Eng., no. 295:138-142, March 1975. 13 refs.*

The design and construction of fabric dust filters for use in areas where continuous operation is necessary at constant air flow rate is discussed. Developments in filter media, permitting high filtration velocities are accompanied by advances in cake removal and fabric cleaning and in the concept of unit construction. A desired rating of filter is achieved by assembly on site of a number of standard prefabricated units. The desired rating is obtained by assembling factory made modules in line, back to back and two or more high, until the necessary filtration area is realized. The use of felted media is usually associated with the adoption of nonmechanical techniques for cake removal and fabric reconditioning. Reverse air cleaning is necessary in continuously rated felted filters and has the advantage that isolation of a section of the unit is unnecessary. Guidelines for the selection and sizing of a fabric filter for a particular objective in a given area are included.

54232 **APTIC NO. 78812**

Saito, Hiroshi and Arao Ikeda

COLLECTING METHOD OF LOW RESISTANCE DUST BY ELECTRIC DUST COLLECTOR. *(Denki shujin sochi ni yoru tei teiko dasuto no shujin hoho). Text in Japanese. (Onoda Cement Co., Ltd. (Japan)) Japan. Pat. Sho 50-16025. 6p., June 10, 1975. (Appl. Sept. 25, 1970, 1 claim).*

This invention relates to the collecting method of dusts of low resistance (specific resistance below 10,000 ohm-cm). Flue gas containing dusts of low resistance was introduced to a cottrell through a duct. Dusts of high resistance (specific resistance above 10,000 ohm-cm) stored in a tank were sprayed into the duct from a chute connected to the tank by a dust adding device which was driven by motor. A blower was used to supply pressurized air to the chute. The mixing resulted in the increase of the resistance of the dusts which were then removed by a conventional electrode. Addition of dusts of high resistance at three locations resulted in 98% removal of the dusts of low resistance in the flue gas.

54233 **APTIC NO. 78455**

Saito, Takayuki

SAMPLING TECHNIQUES OF SULFUR DIOXIDE-CONTAINING GASES. (Nisanka iou ganyu gasu no sampuringu hoho). Text in Japanese. (Sumitomo Chemical Ind., Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 50-7470. 3p., March 26, 1975. 2 refs. (Appl. Aug. 8, 1970, 1 claim).

A new method of gas sampling of gases containing sulfur dioxide from the burning of sulfur-containing minerals was developed. In order to remove dust and mist, the water-rinsed gas is introduced into an electric dust collector consisting of two different temperature parts. The temperature of the lower part should be maintained at less than 50 C so that the condensed liquid will remove dust and mist which adheres to the electrode. The temperature of the higher part is kept 20 C higher than the lower part in order to maintain high resistance between discharge and dust collection electrodes. After passing through the dust collector, the gas is led to a glass wool filter and heat exchanger to obtain the normal temperature of gas. The resultant gas is dust and mist free and can be introduced to the gas analyzer for continuous checking of SOx concentration.

54234 **APTIC NO. 78965**

Sakai, Fumiko, Haru Enodo, Shakuko Jo, Eikichi Kin, and Hiroshi Takahashi

DETERIORATION OF AUTOMOBILE EXHAUST GAS PURIFYING CATALYST CAUSED BY LEAD AND ITS REGENERATION METHOD. *(Jidoshayo haiki joka shokubai no namari hidoku to sono saisei). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 583-589, 1975. 4 refs. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

Toward the development of a regeneration technique for catalysts used in exhaust gas cleansing devices, the poisoning mechanism of catalysts by the lead contained in gasoline and lubricant gas experimentally investigated using 0.5% platinum carried on activated alumina as the oxidation catalyst. The adsorption isotherm of nitrogen was obtained by the Brunauer, Emmett, and Teller method, substances adsorbed on the catalyst surface were determined by EMX, and dispersion of Pt was measured by ESCA, X-ray diffraction, and electron ray diffraction. In the case of using gasoline containing Pb, cleansing rates for carbon monoxide and hydrocarbons were deteriorated markedly at about 10,000 km of driving. The main cause for the deterioration in catalytic activity was found to be lead sulfate deposited on the Pt catalyst surface. The PbSO4 deposited can be removed readily by treating with an aqueous ammonia solution of ammonium tartrate; the catalytic activity can be recovered completely.

54235 **APTIC NO. 78626**

Saleem, A. and J. D. Sheehan

APPLICATION OF THE PHOSPHATE PROCESS TO A LARGE UTILITY BOILER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-08.7.)*

The Phosphate Process for removing sulfur dioxide from stack gases is described along with its potential application to large utility boilers. The process utilizes a buffered solution of sodium phosphate for scrubbing SO2 from off gas. Commercial grade sulfur is produced during the regeneration of phosphate liquor with hydrogen sulfide gas. Hydrogen sulfide for regeneration is produced by reacting part of the sulfur produced with a hydrocarbon such as coal, oil, or natural gas. Pilot plant tests demonstrate the ability of the process to reduce SO2 emissions consistently to less than 100 ppm while simultaneously producing bright sulfur. The total power requirement of the process for a 600-megawatt boiler burning 3.5% sulfur coal is an estimated 6 Mw, excluding any flue gas reheating. This amounts to about 1% of the boiler output. (Author abstract modified)

54236 **APTIC NO. 78966**

Sasaki, Shozo, Kazuo Shinoda, and Masatoshi Sugiura

ON THE FLOW RATE ACCURACY OF CARBURETOR AND EMISSION CONTROL MEASURES. *(Haishutsu gasu taisaku to kikaki no ryuryo seido ni tsuite). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 615-618, 1975. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

For more efficient exhaust emission control by reduction of the irregularity of emissions, greater accuracy in air-fuel ratio is required for the carburetor. The effect of flow rate accuracy of the carburetor on exhaust gas emissions was investigated. Factors affecting the air-fuel ratio characteristics in each performance region (slow region, primary main region, secondary main region, acceleration, deceleration, and engine warm up) were evaluated for the use of a catalytic converter. In 10 mode driving, the slow flow rate region and primary main flow rate region were used most frequently, and therefore the primary main jet, slow jet, and slow port were modified for the improvement of air-fuel ratio accuracy. In 11 mode driving, the effect of the choke system was most prominent, and therefore the automatic choke was modified and an auxiliary acceleration pump was added. The necessary flow rate is determined according to the emission standards and driving performance of vehicles, and is about + or - 3% in the case of 10-mode driving.

54237 **APTIC NO. 78636**

Schneider, Gilbert G., Theodore I. Horzella, Jack Cooper, and Philip J. Striegl

SELECTING AND SPECIFYING ELECTROSTATIC PRECIPITATORS. *Chem. Eng., 82(11):94-108, May 26, 1975.*

Factors to consider in selecting and specifying electrostatic precipitators are discussed. Basic structural considerations include: the support structure, casings, stresses in the structure, roofs, penthouses, superstructures, and hoppers. There are two basic designs of discharge electrode systems offered by manufacturers, the wire weight system and the rigid wire frame. The keys to any successful collecting surface are dust plate trueness, ruggedness of the support system (and its dimensional tolerances), alignments, rapper anvils, alignment tolerances, and baffles. Rappers are used to remove dust from the collecting and discharge surfaces, and their effectiveness and reliability are vital. The installed costs of electrostatic precipitators vary considerably, depending upon construction, location, whether they are new or retrofitted, and on the season of the year.

54238 **APTIC NO. 78467**

Schuetz, H.

THE SEPARATION OF OIL MISTS IN THE METAL WORKING INDUSTRY. *(Das Abscheiden von Oelnebeln im metallbearbeitenden Fertigungsbetrieb). Text in German. Metall. (Berlin), 29(6):598-602, 1975.*

Techniques and devices available for the separation of oil mists in the metal-working industry for clean air maintenance are described. Oil mist emissions can be efficiently controlled without excessive investment. The separation of oil mists with flash points below 150 C may be problematic, and certain techniques and devices are not suitable for such purposes. Portable glass-fiber mat-packed filters with direct exhaust from the machine tools are suitable for oil mist concentrations ranging from 100 to 150 mg/cu m. Electrostatic precipitators designed for the separation of oil mists have high efficiency. Portable electrostatic precipitators serving individual equipment are usually more economical than central systems.

54239 **APTIC NO. 78802**

Schwartz, H.

PROSPECTS OF THE APPLICATION OF FUEL CELLS IN ELECTROMOBILES. *(Aussichten der Anwendung von Brennstoffzellen im Elektro- Strassenfahrzeug). Text in German. Automobiltech. Z. (Stuttgart), 77(6):176-180, 1975. 5 refs.*

The state of art, possibilities and problems in the area of fuel cells as an energy source for electrically powered vehicles are reviewed. Fuel cells using oxygen and hydrogen and an alkaline electrolyte (potassium hydroxide) are the most advanced and promising of all fuel cells. However, there is as yet no optimal hydrogen source for the fuel cell available. Ammonia, certain reformed hydrocarbons, and metal hydrides are experimented with as alternatives for liquid hydrogen. The byproducts of such fuel cells are environmentally harmless water and waste heat. At identical capacity, fuel cell aggregates are lighter than lead batteries, but the latter are substantially cheaper. While fuel cells are attractive as energy sources for automobiles in view to the technical data, the unavailability of an appropriate reagent and of the high price involved indicate that fuel cells will not be used in automobiles during the decade to come. Fuel-cell-powered forklift trucks and subcompact automobiles are being experimented with.

54240 **APTIC NO. 78602**

Seizinger, Donald E.

OXYGENATES IN EXHAUST GASES SUBJECTED TO CATALYTIC OR THERMAL CONVERSION. *Energy Research and Development Administration, Bartlesville, Okla., Bartlesville Energy Research Center, Rept. BERC/RI-75/1, 16p., May 1975. 19 refs.*

Exhaust oxygenates and other engine emissions were measured from vehicles equipped with three different low-emission systems: oxidation catalyst, oxidation-reduction catalyst, and lean thermal reactor. Exhaust samples were collected during cyclic operation of the vehicle following the CVS-72 Federal driving cycle, using three fuels having different aromatic contents. Tests were run at two temperatures on a chassis dynamometer housed in an environmentally controlled space. Exhaust emissions were analyzed using gas chromatography and other established routine emission procedures. Exhaust aldehydes consisted primarily of formaldehyde and other aliphatic and aromatic aldehydes. The only unsaturated aliphatic aldehydes measured were acrolein and methacrolein. Other oxygenates measured were alcohols, ethers, ketones, esters, and nitroalkanes. The aldehyde levels were generally higher than those of the other oxygenates measured. The aldehyde levels for the vehicle equipped with the oxidation catalyst were slightly lower than levels from the system equipped with the oxidation- reduction catalyst, and both were much lower than that from the lean thermal reactor. Nitromethane and total aldehyde levels were similar in the oxidation catalyst treated exhaust; whereas, the nitromethane was significantly lower than the total aldehyde levels in the thermal reactor and oxidation reduction catalyst treatec exhaust. Little or no effect on oxygenate emissions was attributable to fuel composition or ambient temperature. (Author abstract modified)

54241 **APTIC NO. 78454**

Seki, Michiharu

WASTE GAS TREATMENT METHOD. *(Haigas shoriho). Text in Japanese. (Hitachi Seisaku-sho, Tokyo (Japan)) Japan. Pat. Sho 50-4622. 6p., Feb. 21, 1975. (Appl. Oct. 9, 1972, 1 claim).*

A simple and economical method for removing both of sulfur oxides and nitrogen oxides from waste gases is described. The device consists of a room containing activated charcoal which has absorbed halogen gas or ammonium halogenide, and an inlet of gaseous ammonia. The NOx and SOx react with ammonium halogenide to produce ammonium sulfate, ammonium nitrate, and separated halogen which is immediately reabsorbed by carbon. By sending gaseous ammonia with waste gas into this system, ammonium halogenide is formed on the carbon to react with NOx and SOx cyclically. The efficiency of simultaneous reactions between ammonium halogenide and NOx and SOx to produce NH4NO3 and(NH4)2SO4 was examined in the case of ammonium bromide with activated charcoal.

54242 **APTIC NO. 78661**

Seki, Michiharu

TREATMENT METHOD FOR EXHAUST GAS. *(Haigasu shori hoho). Text in Japanese. (Hitachi, Ltd. (Japan)) Japan. Pat. Sho 50-24266. 4p., Aug. 14, 1975. (Appl. Nov. 6, 1972, 1 claim).*

A combined denitrification and desulfurization device was designed for the treatment of exhaust gas from thermal generators and boilers. A moving bed of a porous substance placed at an angle to the flow direction of gas is divided into two sections in the adsorption tower. In the first section (closer to the exhaust gas inlet) the porous substance is activated carbon or graphite, carrying at least one ammonium halogen selected from a group consisting of ammonium chloride, ammonium bromide, and ammonium iodide. Here, the nitrogen oxides and sulfur oxides are adsorbed as ammonium salts and removed. In the second section, gaseous ammonia is injected, and the halogen liberated in the first section reacts with NH3, producing NH4X. The NH4X is adsorbed on activated carbon, which is continually moved into the first section. In the treatment of boiler exhaust gas containing 750 ppm of sulfur dioxide with activated carbon carrying ammonium iodide, the removal rate of SOx was 95%.

54243 **APTIC NO. 78872**

Sengespeick, R.

REDUCTION OF ENERGY COSTS IN INDUSTRIAL VENTILATION AND PROCESSING PLANTS THROUGH REGENERATIVE HEAT RECOVERY. *(Energiekostensenkung in industriellen Lueftungs und Verfahrensanlagen durch regenerative Waermerueckgewinnung). Text in German. Energie, 27(4):110-113, 1975. 4 refs.*

Technical and economic aspects of regenerative heat recovery equipment for industrial ventilation and process heat recovery are described. Econovent model heat exchangers, using fine asbestos plates impregnated with lithium chloride as a heat storage mass are suitable for industrial and domestic use. Ljungstroem type air preheaters with continuously rotating heat storage mass are used for combustion air preheating at boiler plants. Rototherm heat exchangers with smooth and corrugated aluminum or steel layers are used for industrial ventilation and heat recovery purposes for waste air containing corrosive components and with temperatures of up to 200 C. Here, the humidity of the waste air is not transferred to the air to be admitted.

54244 **APTIC NO. 78730**

Shinnar, Reuel

ENERGY IN PERSPECTIVE. *Chem. Technol., 1975:225-231, April 1975.*

The energy crisis is discussed in terms of existing technical alternatives to oil burning and their estimated investment costs. The cost of new energy sources in terms of dollars per barrel of oil equivalent is estimated to be 12-15 for methanol from coal, 10 for synthetic natural gas from coal, 12 for coal liquefaction, 4-8 for pollution-free coal-burning power plants, and 10-12 for oil derived from oilshale. Investment costs of pollution-free fuel from coal in terms of dollars per barrel of oil consumed per day are estimated to be 8000-10,000 for coal gasification, 10,000-12,000 for coal liquefaction, 9000-15,000 for methanol production, 3000-6000 for the conversion of existing coal-burning power plants, and 2500-4000 for the extra cost of a new power plant. An immediate scale-up in the building of coal conversion plants is recommended.

54245 APTIC NO. 78466

Sperber, R.

EFFICIENCY, RELIABILITY, ENVIRONMENTAL PROTECTION - CURRENT TASKS AND FUTURE PROGRAM. *(Effektivitaetm Zuverlaessigkeit, Umweltschutz - Tagesaufgabe und Zukunftsprogramm). Text in German. Maschinenbautechnik, 24(3):137-139, 1975. 7 refs. (Paper presented in the Magdeburg Symposium on Internal Combustion Engines, 3rd, Magdeburg, East Germany.)*

Short-term and long-term tasks in diesel engine construction concerning the development of new designs with increased efficiency and reliability, and reduced pollutant emissions are outlined. While modifications of the combustion chamber and of the beginning of delivery have been promising experimentally, the abatement of exhaust turbidity will require continued joint research by industry and universities. Measures such as exhaust gas recirculation, combustion air cooling, adjustment of the beginning of delivery, and their combinations were promising in experiments concerning the abatement of nitrogen oxides emissions. Measurements of soot emissions, of exhaust toxicity, and method for the abatement of nitrogen oxides, soot and odorous components will be a joint research program of the Comecon member countries

54246 APTIC NO. 78889

Stresemann, Ernst, Dieter Oswald, and Helge Dhonau

EFFICACY TEST OF AN AIR FILTER UNIT FOR HAY FEVER PATIENTS - A DOUBLE BLIND STUDY. *(Wirkungspruefung eines Luftfiltergeraetes bei Heufieberkranken - eine Doppelblindstudie). Text in German. Staub, Reinhaltung Luft, 35(6):219-220, 1975.*

The efficacy of room air filtration in bedrooms of 11 hayfever patients was investigated in a double-blind study using a fully equipped, high-efficiency particulate air filter with a filter insert with 99.99% efficiency for the 0.3 micron fraction, and a similar air filter without the latter filter element. The 8-week test revealed no significant difference in the typical symptoms of hayfever, but it showed a significant reduction of the quantity of the drugs used by the patients by the end of the experiment.

54247 APTIC NO. 78679

Sugioka, Masatoshi, Tomimori Hosotsubo, and Kazuo Aomura

TREATMENT EFFECT OF HYDROGEN SULFIDE IN CUMENE CONTACT DECOMPOSITION BY A CADMIUM Y TYPE ZEOLITE CATALYST. SULFUR TREATMENT CATALYST (REPORT I). *(Kadomium Y gata zeoraito shokubai ni yoru kumen sesshoku bunkai ni taisuru ryukai suiso no shori koka). Text in Japanese. Preprint, Chemical Society of Japan, Hokkaido Branch, Hokkaido (Japan), p. 9, 1975. (Presented at the Chemical Society of Japan, Hokkaido Branch, Summer Lecture Meeting, Hokkaido, Japan, July 26, 1975.)*

In order to determine the effect of sulfur compound hydrogen sulfide on cumene conversion by a cadmium-type zeolite catalyst (CdY), experiments were conducted with a pulse reactor, using helium as the carrier gas. After ion-exchanging sodium (Sk-40) in cadmium chloride solution, and baking for 4 hr at 500 C, CdY was prepared. The ion exchange ratio was 75.2%. Hydrogen sulfide treatment of the catalyst was conducted by injecting certain quantity of H2S into a reactor tube in a pulse lime manner by injector cumene conversion was carried out using 10 mg of CdY, at a temperature of 300 C, carrier gas velocity of 26 cc/min, and 2 microliters of cumene. The CdY had been treated with 2 cc H2S and untreated CdY were used. The initial activity of CdY treated with H2S increased sharply compared with the initial activity of the untreated CdY, as many as 6 times (activity at first pulse). The experiment was carried out by heating untreated CdY to 400 C. The initial activity of CdY treated with H2S and heated at 300 C corresponded approximately to that of untreated CdY heated to 400 C. Cadmium treated with H2S did not lose its activity against pulse numbers, compared with untreated CdY. Cumene conversion increased when CdY was treated with H2S because H2S was adsorbed to CdY irreversibly, forming a new acid point (possibly B acid point).

54248 APTIC NO. 78706

Suzuki, T., M. Ujihashi, and N. Habu

EXPERIMENTAL STUDY OF STRATIFIED CHARGE ENGINE WITH PRECHAMBER. *(Fukushitsushiki seiso nensho kikan no jikkenteki kenkyu). Text in Japanese. Toyota Gijutsu (Toyota Eng.). 24(4):594-601, July 1975. 5 refs.*

Experimental studies were conducted on a stratified charge engine that is designed to reduce nitrogen oxides, hydrocarbons, and carbon monoxide emission by combustion control in the engine cylinder. A description of the engine and its modifications is given. Experimental results concerning the shape of the prechamber and main combustion chamber, capacity ratio of the prechamber, compression ratio, and injection timing are obtained from a bench test of a pilot four cylinder stratified charge engine. NOx reduction was superior to the carburetor type gasoline engine. The capacity ratio of the prechamber was 55%, based on the output and exhaust gas emission characteristics. The oval-shaped prechamber, connected to the main chamber with a slanted circular opening, was suitable. The flame dispersion type main combustion chamber was effective for the reduction of HC and CO emission. Delayed injection timing was clearly advantageous.

54249 APTIC NO. 78782

Svarovsky, L.

GAS CYCLONE SELECTION PROCEDURE. *Chem. Engr., no. 295:133-135, March 1975. 2 refs.*

A procedure for the selection of gas cyclones for dust control was developed. It is based on the satisfaction of two basic sets of requirements: a given gas flow rate and efficiency both at a minimum power required (minimum pressure drop). Formulae for calculating these criteria are included. The procedure can be applied to cyclones from a number of manufacturers offering somewhat different cyclone designs in order to select the best and cheapest installation.

54250 APTIC NO. 78827

Swift, P.

DUST CONTROL RELATED TO THE BULK DELIVERY OF PARTICULATE MATERIALS. *Chem. Eng., no. 295:143-145, 150, March 1975.*

The factors controlling the correct application of fabric filters in the control of dust related to the bulk delivery of particulate materials are discussed. Effective fabric filtration requires that the filter used is of sound intrinsic design and that the selection of the filter in type and size is right for the particular application involved. The two most important design characteristics of a fabric filter are the effective fabric area and the method of cleaning the filter (mechanical or high pressure reverse jet cleaning). The effective filtration area is related to the volume rate of air filtered, the quantity of dust reaching the filter in a given time, and the fineness of the dust by the average filtration velocity. These principles are applied to the position of filters in tanker delivery systems.

54251 APTIC NO. 78728

Tamaki, A.

SO2 PROCESSING: THE THOROUGHBRED 101 DESULFURIZATION PROCESS. *Chem. Eng. Progr., 71(5):55-58, May 1975.*

The Chiyoda Thoroughbred 101 flue gas desulfurization process is described. Desulfurization is accomplished by a dilute sulfuric acid-gypsum process which results in the removal of sulfur dioxide as well as particulates from large utility boilers. Flue gas from the outlet of an electrostatic precipitator is sent to a prescrubber for the removal of about 50% of the total particulates. Cooled flue gas from the prescrubber then flows into the bottom of an absorber where SO2 is absorbed by a dilute sulfuric acid absorbent. Part of the absorbent containing accumulated sulfuric acid as a result of SO2 absorption is sent to a circulating type crystallizer, and the acid is neutralized with limestone to a concentration of 0.7-1.0%. Gypsum is recovered from the gypsum-suspended liquor in a basket type centrifuge. A desulfurization efficiency of about 90% is achieved for boilers burning 1% sulfur fuel oil when the sulfuric acid concentration of the Chiyoda process is maintained at 2.3%. The system also includes a mist eliminator.

54252 **APTIC NO. 78451**

Tateyama, Kanji and Masakatsu Kawada

A SIMPLIFIED EXHAUST GAS RECIRCULATION DEVICE.

(Kani haikigasu kangen sochi). Text in Japanese. (Fuji Heavy Industries, Tokyo (Japan)) Japan. Model Util. Sho 50-4894. 2p., Feb. 10, 1975. (Appl. June 30, 1971, 1 claim).

Mixing exhaust gas with intake gas is a highly effective method for reducing the maximum combustion temperature of fuel and reduces emission of nitric oxide. A simplified exhaust gas reduction method is presented. A guide pipe of exhaust gas is introduced into the vent of carburetor. The top of this guide pipe is located under the throttle valve wing when it is fully opened, so that the guide pipe is closed completely by the wing itself when the temperature of the combustion system is low. As the temperature increases, the valve rotates and the pipe end is opened so that recirculation takes place.

54253 **APTIC NO. 78682**

Terao, Kunio

WASTE GAS CLEANER FOR INTERNAL COMBUSTION ENGINES.

(Nainen kikan yo haiki gasu joka sochi). Text in Japanese. (Muraoka Seisakusho Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-14022. 2p., April 30, 1975. (Appl. Sept. 11, 1967, 1 claim).

The gas discharged from an engine is sent into an evaporator filled with water. In the course of the passage of the gas through the water layer, larger particles such as carbon pieces are collected and removed. By the passage of the discharge gas, the water is heated and evaporates to give a large amount of steam. The mixture of the steam and the discharged gas is then led into a diffusion chamber, in which the gases are mixed together. The mixed gas is then led into a cooling tube, where the steam condenses to form fog or dew particles around the nuclei, which are provided by the fine solid particles in the discharged gas. The mixture of the condensed particles and the gas is then led into a filter, where the dust particles are easily collected together with the water drops. A bypass pipe is installed between the upstream of the discharged gas and the space above the water in the evaporator. This tube is necessary to prevent the back-flow of water in the evaporator into the ezzzze in cases when the engine is driven in the reverse direction. Several plates and lattices are also installed in the water in the evaporator to promote contact between the discharged gas and water.

54254 **APTIC NO. 78929**

Tohata, H.

TECHNIQUES FOR NOX REMOVAL.

(NOx jokyo gijutsu). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 39(9):481-490, 1975. 38 refs.

Dry and wet denitrification processes are reviewed. The nonselective, catalytic reduction method uses carbon monoxide to reduce the nitric oxide in waste gases to nitrogen and to convert the nitrogen dioxide to nitric oxide and then to nitrogen. The method also uses hydrocarbons such as methane as the reducing agent and the reduction can be carried out at SV 50,000/hr with noble metals as catalysts. The selective, catalytic reduction method using noble metals such as platinum or palladium as catalysts and ammonia as the reducing agent is widely applied. Reduction is usually carried out at 210-310 C at SV up to 50,000/hr with more than 90% denitrification. Process with base metals as catalysts are also being developed. A wet-type oxidation-absorption method uses ozone or chlorine dioxide as the oxidizing agent to convert nitric oxide to nitrogen dioxide and recover it as nitric acid after it is absorbed in water. A wet process is preferred for simultaneous removal of NOx and sulfur oxides. An ozone reactor is added to a desulfurization process and nitric oxide in the flue gas is first converted to NOx which enters the absorbing tower with the SO2.

54255 **APTIC NO. 78694**

Trafton, B. A.

DIESEL HAULAGE EQUIPMENT IN AN UNDERGROUND POTASH MINE.

Bureau of Mines Information Circ., vol. 8666:117-124, 1975. (Presented at the Symposium on the Use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)

The control of exhaust emissions from diesel haulage equipment in an underground potash mine is discussed. Exhaust gas, service and maintenance requirements are met on the exhaust system using Englehard PTX catalytic purifiers instead of water scrubbers. An exhaust system with larger diameter piping and a heat diffuser at the end was designed to control exhaust gas discharge temperature and hold back pressure. Efficient diesel engine operation results from clean, good quality fuel, a correctly maintained fuel-air ratio, and sufficient ventilating air directed through the working area to dilute and remove exhaust gases.

54256 **APTIC NO. 78923**

Tsunemoto, Hideyuki and Hiromi Ishiya

EXHAUST GAS RECIRCULATION AND VARIOUS CHARACTERISTICS OF DIESEL ENGINE.

(Diizeru enjin ni okeru EGR to shoseino). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 501-510, 1975. 10 refs. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)

Effects of exhaust gas recirculation (EGR) in terms of the effects of oxygen concentration on nitric oxide emissions, smoke, and engine output were investigated using direct injection (DI), DI + Turbo charger, and pre-chamber engines. The exhaust gas composition and variation in heat capacity were determined. A significant correlation was found between intake O2 concentration and NO reduction rate. The estimation of reduction rate independent of driving conditions and engine type seems to be possible. The O2 concentration was reduced by EGR, which resulted in increased smoke emission; however even at the same actual excess air ratio, smoke emission increased with EGR. A correlation was found between performance variation at EGR and the O2 concentration of exhaust gas. The reduction rate of NO, maximum effect of EGR, and variation in engine output can be calculated from the initial value. Data on NO reduction by intake humidity can be superimposed on the correlation curve of the NO reduction rate and O2 concentration, and therefore the NO reduction by humidity variation can be handled the same as intake O2 concentration.

54257 **APTIC NO. 78913**

Tsuriya, Y.

ENVIRONMENTAL POLLUTION CONTROL OF EXHAUST GAS AND OFFENSIVE ODOR.

(Haigasu, akushu to no kankyoosen taisaku). Text in Japanese. Insatsukai (Printing World), no. 261:84-93, Aug. 1975.

Control measures for environmental pollution due to toxic gases, vapor, and particulates in a printing plant are discussed. A pollution evaluation method and over-all environmental pollution control plans, particularly pollutant source control for the working environment and atmospheric environment, are described. An air purification system using various types of hoods, modifications in working procedures, and isolation and modification of equipment discharging air pollutants are discussed. Descriptions of exhaust gas treatment by absorption, adsorption, direct combustion and catalytic oxidation methods, and of dust collection by sedimentation, cyclone, spray scrubbing and electric precipitator methods are given, with their characteristics, including treatment conditions and efficiency.

54258 **APTIC NO. 78635**

Tsutsumi, Shigeru and Toru Takihara

A DESULFURIZATION METHOD FOR PETROLEUM CONTAINING SULFUR. *(Iou konyu sekiyu No datsuryu ho). Text in Japanese. (Sanyo Electric Co., Ltd., Moriguchi City (Japan)) Japan. Pat. Sho 50-17081. 2p., June 18, 1975. (Appl. March 18, 1971, 1 claim).*

A desulfurization method employing the irradiation of petroleum by microwaves in the presence of alkaline metal hydroxide and water. This induces an electrical discharge within the petroleum. Without the presence of water in the petroleum, the microwave irradiation did not cause the electric discharge and only the slight increase in the petroleum temperature resulted. An experimental test of this method was done as follows: 62% of the sulfur was removed from 10 g of heavy oil with a 2.5% sulfur content when it was irradiated for 25 min with 500 W microwave (2450 MHz) in the presence of 3 g potassium hydroxide and 0.5 g water. The desulfurization efficiency was 45% when the potassium hydroxide was replaced by sodium hydroxide under the same experimental conditions. Since neither a high-temperature nor a high-pressure system was required, the desulfurization method is safe and the desulfurization apparatus is simple.

54259 **APTIC NO. 78794**

Van Ginneken, A. J. J. and J. P. Klein

THE DESULPHURISATION AND PURIFICATION OF GASES. *Preprint, World Petroleum Congress, Japanese Organizing Committee, 10p., 1975. 17 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

The desulfurization and purification of gases from the complete combustion of petroleum oils are described. The three main fields of gas treating include: the removal of sulfur dioxide from combustion off-gases; the removal of hydrogen sulfide from natural and industrially produced fuel gases; and the reduction of SO2 emission of Claus sulfur recovery units. Processing techniques available to remove the S compounds from each of these gases and methods of selectively separating H2S from carbon dioxide are discussed. Emphasis is placed on the characteristics of a process influence, its efficiency, its energy consumption, its associated secondary pollution, and its economics. (Author abstract modified)

54260 **APTIC NO. 78922**

Vicktor, H.

REGENERATIVE HEAT RECOVERY. *(Regenerative Waermerueckgewinnung). Text in German. Heizung Lueftung Haustech., 26(3):111-114, 1975. 1 ref.*

Systems and apparatus for regenerative heat recovery and their economic aspects are described. Regenerative heat recovery systems, using rotating heat exchange masses which are alternately exposed to the discharged and incoming air, are able to recover both the latent and the sensible heat from the air, and operate at high efficiency. The energy consumption of such apparatus is fairly low. Low-speed devices permit substantial savings of energy costs (up to 50% for fuel oil, up to 55% for natural gas, up to 60% for remote heat, and up to 65% for night-rate electricity). Combined with a heat pump, such regenerative heat recovery systems are able to equalize the temperature in different parts of buildings. Regenerative heat recovery systems are especially suitable for large buildings with central heating and air conditioning systems.

54261 **APTIC NO. 78434**

Walker, David G.

MAKING AND USING CO. *Chem. Technol., vol. 1975:308-311, May 1975. 8 refs.*

A new commercial process to separate carbon monoxide from a variety of gaseous mixtures including nitrogen rich streams was developed. The process is tradenamed Cosorb. It is based on the selective complexation of CO in an aromatic solvent with an activating agent referred to as copper aluminum chloride (CuAlCl4). Other components in the gas stream, nitrogen, hydrogen, carbon dioxide, oxygen, and methane, are either only slightly soluble or are only dissolved rather than complexed. A coal gasification process, using an air burner gasifier and Cosorb to separate CO, is an economical way to use coal as a source of pure CO for chemical synthesis and ore reduction. The main areas where substantial economics result over previous technology are gasification, work of compression, and gas purification.

54262 **APTIC NO. 78925**

Warnqvist, Bjorn and Ragnar Bernhard

REMOVAL OF CHLORIDE FROM RECOVERY SYSTEMS BY REACTIONS WITH SULFUR DIOXIDE. *Svensk Papperstid. (Stockholm), 78(11): 409-410, Aug. 25, 1975. 3 refs.*

A reaction is given that can be used to convert sodium chloride in fly ash from recovery furnaces burning thick liquor into gaseous hydrogen chloride. The NaCl reacts with sulfur dioxide, water vapor, and oxygen to form sodium sulfate and HCl. A preliminary theoretical model and mill results indicate that the amounts of SO2 formed in the combustion of kraft black liquor are sufficient to convert moderate amounts of chloride into HCl. The hydrogen chloride produced may be removed by scrubbing the gas with water by known techniques. (Author abstract modified)

54263 **APTIC NO. 78721**

Weigel, H. and G. Melcher

DO SO2 EMISSION PROBLEMS WITH THE COPPER REVERBERATORY FURNACE BELONG TO THE PAST? *(Gehoeren SO2-Emissions probleme beim Kupferflammofenbetrieb der Vergangenheit an)? Text in German. Metall, 29(5):458-464, 1975.*

The possibilities of controlling sulfur dioxide emissions from copper ore-smelting reverberatory furnaces to comply with the SO2 emission standards were studied in thermodynamic and reaction kinetic calculations on the basis of technological data on the UTAH-SMELTER of Kennecott Corp. The ore concentrate processed here is composed of chalcopyrite, bornite, chalcocite, covellite, and pyrite, and natural gas is used for the smelting process. The destruction of the SO2 formed from the sulfites and or the roasted ore concentrates by carbon dioxide and oxygen present in the furnace atmosphere takes place in the immediate vicinity of the charging surface. Due to the addition of small quantities below (1%) of coal or coke, the oxidation potential was sufficient for the suppression of SO2 formation due to the oxidation of the ore sulfide by oxygen and CO2. Coal with a grain size below 2 mm is necessary for nonroasted charge, while roasted concentrates require broken coke ranging from 5 to 50 mm in size.

54264 **APTIC NO. 78890**

Westphal, Bernhard W. and Juergen Boehme

TRASH AND SEWAGE SLUDGE INCINERATION PLANT KREFELD. *(Muell- und Klaerschlammver-*

brennungsanlage Krefeld). Text in German. Energie, 27(5):122-130, 1975.

The combined municipal waste and sewage sludge incinerator plant constructed recently in Krefeld, West Germany, is described. Waste incineration is done on Duesseldorf system grates in a temperature range of 800-1200 C. The hot flue gases are cooled and dedusted in an electrostatic precipitator, after which they are washed for the removal of hydrochloric acid, hydrofluoric acid, and sulfur dioxide. The air pollutant emission from the waste incinerator plant is negligible.

54265 **APTIC NO. 78955**

Windhorst, Kenneth A. and Jack H. Lunsford

ACTIVITY OF A (COIII(NH3)NNO)2+-Y ZEOLITE FOR THE CATALYTIC REDUCTION OF NITRIC OXIDE BY AMMONIA. *J. Chem. Soc., vol. 20:852-853, 1975. 3 refs.*

A gas mixture consisting of 0.7 torr nitric oxide, 50 torr ammonia, and 710 torr helium was passed over a (COIII(NH3) nNO)2+ (cobalt ammonia) catalyst and the exit gas was analyzed for molecular nitrogen, NO, nitrogen dioxide, and water vapor. The complex in a y-type zeolite is a catalyst for the conversion of NO and NH3 to N2 and H2O provided the partial pressure of NO in the gas phase is less than 1 torr. The activity of the catalyst decreased at temperatures below 50 C. Infrared spectra suggest that the slow oxidation of the COII ammine complex to hexamminecobalt (III) is responsible for the loss in activity at the lower temperatures.

54266 **APTIC NO. 78964**

Yamagata, Y., Y. Yoshimitsu, T. Yamamoto, and I. Uehara

STUDIES ON AIR POLLUTION AND OFFENSIVE ODOR REMOVAL: NITROGEN OXIDES TREATMENT BY ALKALI ABSORPTION. *(Taiki osen, akushu bojo ni kansuru kenkyu (Dai 3 po): Arukari kyushi ni yoru chisso sankabutsu no shori ni tsuite). Text in Japanese. Kure Kogyo shikenjo hokoku (Rept. Kure Ind. Res. Inst.), no. 18:90-94, Aug. 1975. 5 refs.*

Nitrogen dioxide was generated by the addition of a sodium nitrite solution to a hydrochloric acid solution in the presence of nitrogen. The resulting gas was passed through an absorbing solution of sodium hydroxide or sodium sulfite or the mixture of the two after dehydrating. The NO2 concentrations before and after the absorption were measured by the JIS KO104 method. Results revealed that 60-80% of the NO2 was removed by the NaOH solution. The 0.15% NaOH solution gave the highest absorbing rate as compared to other concentrations up to 10%. More than 90% of the NO2 at higher concentration up to 1000 ppm was removed by using 5% Na2SO3 solution. Treatment of the hydrogen sulfide formed was necessary when Na2SO3 was used as the absorbent. The formation of NO2 during a diazotization process at an azo dye plant was greatly reduced by improving the operating conditions, such as reducing the amount of NaNO2 used and decreasing the temperature while increasing the time of the diazotization.

54267 **APTIC NO. 78811**

Yamamoto, Tatsuji, Eisuke Horiike, Masaaki Murakami, Tatsuo Hosoya, Tsuneo Miyanishi, and Shigenari Amamiya

REMOVING METHOD OF NITROGEN OXIDES. *(Chisso sankabutsu jokuo hoho). Text in Japanese. (Kyowa Kakao Kabushiki Kaisha (Japan)) Japan. Pat. Sho 50-24267. 4p., Aug. 1975. (Appl. Nov. 30, 1972, 1 claim).*

This invention relates to the removal of nitrogen oxides with an aqueous alkaline solution. Waste gas was introduced to an absorbing tower at a flow rate of 0.7-1.0 m/s while sodium hydroxide solution was pumped to the top of the tower at 10-15 l cu m gas. The liquid was sprayed to the waste gas and the resulting gas was led to a second absorbing tower and then a decomposition tower where the remaining NOx were removed by sodium sulfide solution or Na2S and NaOH mixed solution. With two absorbing towers and one decomposition tower, NOx concentration was reduced from 2500 ppm to as low as 36 ppm, or 99% removal. With three absorbing towers, the rate of removal was below 80%.

54268 **APTIC NO. 78714**

Yoshizumi, K., T. Tsukada, T. Watanabe, and T. Ohira

ADDITIVE EFFECTS OF OXYGEN-CONTAINING COMPOUNDS ON GASOLINE. *(Insano kagobutsu no gasorin e no tenka koka). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 6:85-98, 1975. 12 refs.*

Oxygen-containing compounds including alcohols, ketones, aldehydes, esters and ethers were studied for their additive effects in gasoline. A 4-cycle, 4-cylinder engine was used for the tests. Methanol, ethanol, isopropylalcohol, acetone, methyl ethyl ketone, methyl formate, methyl acetate, ethyl acetate, ether, and acetaldehyde (5, 10, 20 vol% for methanol and 20 vol% for the others) each was added to regular gasoline, and the exhaust gases at various running conditions were analyzed by non-dispersive infrared spectrometry, gas chromatography, and flame ionization detector. At steady state (constant torque and constant engine rotation), methanol, ethyl acetate and acetone showed no apparent effects on the exhaust gases, with excess air ratio being the only decisive factor. At constant speed and 10-mode running conditions, the 10 additives showed reduction effects on the exhaust gases, again with the excess air ratio being the predominating factor. Methanol and methyl formate showed the greatest reduction effects. The reduction of lower hydrocarbons were found most significant. Methyl formate reduced the carbon monoxide, nitrogen oxides and hydrocarbons from 31.2, 2.54 and 2.72 g/km to 6.2, 1.55 and 1.89 g/km, respectively.

54269 **APTIC NO. 78463**

THREE BUSSES OF THE PARIS AREA TRANSPORTATION AUTHORITY ARE POWERED BY LIQUEFIED NATURAL GAS, A NON-POLLUTING ENERGY. *(Le G.N.L. Nouvelle energie non polluante fait rouler trois autobus de la R.A.T.P.). Text in French. Rev. Gen. Froid, no. 5:469-474, May 1975.*

Three buses of the Paris Area Transportation Authority have been running on liquefied natural gas since early 1975. The liquefied natural gas is stored in double-walled steel cylinders of 120 liter volume under 2-6 bar pressure at very low temperature. The action radius of the bus is 150 km between two fillings. The exhaust gases contain less than 1% carbon monoxide, and no sulfur, bromine or chlorine. The nitrogen oxides emissions are lower than in gasoline engines.

54270 **APTIC NO. 78659**

Toa Nenryo Kogyo, KK

ON THE RESULTS OF NOX REDUCTION TESTS IN AN OIL HEATING FURNACE. *(Sekiyu kanetsu-ro ni okeru NOx teigen tesuto no kekka ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollut. Yokohama-Kawasaki Ind. Area), p. 170-174, Feb. 1975. 2 refs.*

Results are reported on nitrogen oxides reduction tests, conducted at Kawasaki Factory, Japan, based on flue gas recirculation methods, utilizing a heating furnace for a steam desulfurization installation. By combining flue gas recycling with low oxygen combustion procedures, both effective NOx reduction and efficiency were achieved, even for an oil-burning heating furnace. Two kinds of heavy oil and gas were used as fuel. Fuel oil compositions (wt% where applicable) are as follows: Heavy oil 1: C, 87.1; H, 11.2; S, 1.16; N, 0.26; ash, 0.04; minimum heat formation, 9750. Heavy oil 2: C, 86.8; H, 12.4; S. 0.38; N, 0.11; ash, 0.008; minimum heat formation, 9980. Burner characteristics were as follows: For heavy oil: Capacity, 49-195 kg/H, with normal capacity at 156 kg/H; oil pressure, below 5.0 kg/sq cm G; steam pressure, below 6.5 kg/

sq cm G. For gas: Capacity, 23-212 kg/H, with normal capacity at 169 kg/H; pressure, below 1.75 kg/sq cm G. During the tests, amount of feed to the furnace was set at 120 kl/H. At a recycle ratio of 20%, about 6% reduction in efficiency was observed. To counteract this effect, percentage of oxygen in burning air in the flue gas recirculation should be kept around 18%. Recycle ratio and excess air should be kept at a minimum. There is no effect of flue gas recirculation on size and stability of flame pattern, and on dust emission.

54271 **APTIC NO. 78848**

STEEL WITHOUT DUST. *(Stahl ohne Staub). Text in German. Technische Umweltmag., no. 1:28-29, 1975.*

The complex reconstruction and modernization of the former Thomas steel plant of the Roechling-Burbach Steel Works at Voelklingen, West Germany, completed in mid-December 1974, has resulted in a 99.5% reduction of the dust emissions compared with the Thomas process. The Thomas process has now been completely abandoned and replaced by the bottom-blown converter process. Here, the dust emissions are abated by the use of oxygen with steam for blowing, and of blow ports with reduced diameter. Each converter is equipped with a separate cyclone type dust separator. The dustfall in the Voelkling area has been reduced by over 40% from 1970-1971 to 1973-1974.

54272 **APTIC NO. 78870**

SEPARATION OF VAPOROUS ORGANIC POLLUTANTS. *(Abscheiden von dampffoermigen organischen Stoerstoffen). Text in German. Chem. Ind., 27(6):312, 1975.*

The ADSOX process for the separation of organic vapors from gases is described. As the direct incineration of organic vapors would require a relatively large amount of auxiliary thermal energy, the organic vapors are first adsorbed on activated carbon from which they are desorbed with hot inert gas for the regeneration of the activated carbon at temperatures of up to 650 C. The organic vapors, thus obtained in high concentration, can be incinerated with a small amount of auxiliary energy. The ADSOX process is especially suitable for vapor contents over 5 g/cu m. The process has the disadvantage of requiring practically dust-free waste gas for the separation of the organic vapors.

1974

54273 **APTIC NO. 78734**

Acherjee, B., R. R. Biswas, M. Banerjee, P. C. Talapatra, G. Pal, M. M. Sen, S. K. Das Gupta, and A. lahiri

STUDIES ON FLUIDIZED-BED COMBUSTION OF A HIGH-SULPHUR INDIAN LIGNITE. *J. Inst. Engrs. (India) (Calcutta), 55(CH 1):28-32, Oct. 1974. 9 refs.*

Data are presented on the combustion and heat transfer characteristics of a 59-kilowatt pilot scale fluidized bed combustor burning high sulfur lignite. Feed rates varied from 8.8-11.2 kg/hr, superficial fluidization velocities from 1.9-2.4 m/sec, bed temperatures from 825-875 C, residual oxygen in the flue gas from 0.2-3%, velocity of water flow in the cooling coil from 2.0-2.6 m/sec, and pressure drop across the bed from 105-170 mm. The proportion of sulfur input found in the flue gas as sulfur oxides was 72% with no limestone addition and 38% with the addition of a stoichiometric proportion of limestone. Further reduction of flue gas SOx to about 15% of the sulfur input was achieved by the addition of a 150% stoichiometric quantity of limestone.

54274 **APTIC NO. 78487**

Allan, C. J.

TWO METHODS FOR OBTAINING LOW EMISSION FROM BAGASSE FIRED BOILERS USING DRY COLLECTORS. *Queensland Society of Sugar Cane Technology (Australia), Proc. Queensl. Soc. Sugar Cane Technol., 41st Conf., 1974, p. 115-122. 1 ref.*

A method for reducing particulate emissions from bagasse-fired boilers controlled with mechanical collectors is described. The method depends on the return of fine material from the secondary circuit of the collection system, resulting in a luminous flame. With adequate return of carbon, the problem of very fine particulate emission disappears. Test data indicated that returning the secondary cleaned gas to the furnace resulted in an emission reduction of from 0.37 to 0.14 g/standard cu m. The method also resulted in increased boiler efficiency. (Author summary modified)

54275 **APTIC NO. 78583**

Astrom, Leif, Franz Kranebitter, Olof Strandell, and David W. Harris

A COMPARATIVE STUDY OF EUROPEAN AND NORTH AMERICAN STREAM PRODUCING INCINERATORS. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Miami, Fla., 1974, p. 26-29 and 255-266. 7 refs. (May 12-15.)*

Experience with steam producing refuse incinerators in Europe and North America is reviewed. The availability of refuse incineration plants is considerably lower than that of fossil fuel fired plants, with the total availability of a refuse incineration boiler after a few years of operation varying between 65 and 85%. The mean dust content of flue gas from refuse incinerators is 3.5 grains/standard cu ft before treatment. Electrostatic precipitators with efficiencies of 97% or more can decrease this value to 0.106 grains/standard cu ft or less. The flue gas content of sulfur oxides is usually small compared with gases from oil or coal burning. Hydrochloric acid concentrations in the flue gas are usually around 690 ppm at a 12% carbon dioxide level. Scrubbers can be used to remove this water-soluble component; however, the fact that HCl is not easily separated from water poses a water pollution problem. The number of steam producing refuse incineration plants in North America is far less than that for Europe due to the latter s long standing fuel availability problems.

54276 **APTIC NO. 78717**

Baker, Edgar Bradbury

ANTI-POLLUTION BY-PRODUCT FROM PHENOLIC CONTAMINANTS. *(Borden, Inc., Columbus, Ohio) U. S. Pat. 3,833, 712. 4p., Sept. 3, 1974. 5 refs. (Appl. Aug. 25, 1972, 4 claims).*

A method has been found for substantially reducing atmospheric pollution caused by contaminative volatile phenolic substances in industrial effluent gas streams while simultaneously preparing a by-product resin suitable as an adhesive component. The method comprises absorbing the contaminants in an aqueous solution of a water soluble alkaline phenolformaldehyde resin, condensing the mixture of absorbing resin and absorbed contaminants to form an augmented resin, and optionally repeating the absorbing and recondensing steps. (Author abstract modified)

54277 **APTIC NO. 78672**

Bodrito, Pierluigi

ABATEMENT OF OFFENSIVE ODORS IN INDUSTRY. *(L abbattimento di odori molesti nell industria). Text in Italian. Inquinamento, 16(10), 3p., Oct. 1974. 3 refs.*

The use of chlorine dioxide to eliminate offensive odors is described and compared in detail with the use of chlorine gas for the same purpose. Descriptions are also given of apparatus for using this substance to purify exhaust gases before release into the atmosphere. Such a tower is generally capable of abating 88-90% of the undesirable odors, and a two-stage plant can eliminate about 99%. Such a 2-stage plant at Bellinzona, Italy, is capable of processing 60,000 cubic meters of air per hour.

The air contains aliphatic amines, organosulfur compounds, mercaptans and trimethylamine at concentrations varying from 10 to 500 ppm. Its water consumption is about 3 cu m/hr. The following cost estimate is given: A plant capable of removing 200-400 ppm of odors from 60,000 cubic meters of air per hour will cost about 600 lire worth of raw materials per hour. This excludes power costs.

54278 **APTIC NO. 78435**

Cernia, Enrico

SOME ACHIEVEMENTS AND PERSPECTIVES OF INDUSTRIAL RESEARCH. *Chim. Ind. (Milan), no. 12:826-834, 1974 (?). 28 refs.*

Gamma alumina based granular supports for catalysts for engine exhaust gas combustion were investigated. The thermal and mechanical characteristics of gamma-alumina were improved and a process was developed which allows production of spheric spheroidal alumina at competitive prices with respect to other materials recommended for this application. It is possible to maintain exhaust emissions for more than 30,000 miles below the maximum limits allowed by 1976 regulations for carbon monoxide and hydrocarbons. The 30,000 miles durability already fulfills the Environmental Protection Agency s specifications, without indication of decay of catalytic activity.

54279 **APTIC NO. 78733**

Hanafi Z. and A. E. Eid

LEACHING OF VANADIUM FROM BOILER FLY ASH IN ALKALINE MEDIA. *Indian J. Technol. (India), 12(11):507-508, Nov. 1974. 20 refs.*

The recovery of vanadium from Egyptian boiler fly ash by leaching in sodium carbonate or sodium hydroxide solutions was investigated. Sodium hydroxide proved to be more effective for the recovery process. An extraction efficiency of 97.7% was achieved with a 1 N solution at 100 C over a soaking period of 12 hr. The maximum extraction efficiency with sodium carbonate was 89.76% using a 1 N solution at 100 C for 24 hr.

54280 **APTIC NO. 78666**

Hicguet, Max

PROCESS FOR HEATING INDUSTRIAL FURNACES. *(Societe D Etudes Et De Recherches Schentifiques Et Minieres, Seine Saint-Denis (France)) U. S. Pat. 3,816,063. 8p., June 11, 1974. 3 refs. (Appl. Dec. 21, 1972, 8 claims).*

The invention described here relates to a process and apparatus for heating industrial furnaces. Liquid fuel at a temperature of 250 C to 500 C and a pressure of 8 to 50 bars is mixed with a quantity of primary air amounting to 25 to 60% of the amount required for a complete combustion. This mixture is subsequently mixed with a quantity of secondary air amounting to 15 to 35% of the amount required for complete combustion. (Author abstract)

54281 **APTIC NO. 78788**

Higashino, Ichiro, Shigeyuki Morita, and Kohei Enmeiji

OPTIMALIZING CONTROL FOR AUTOMOBILE ENGINE. *Mem. Fac. Eng., Osaka City Univ., vol. 15:7-13, Dec. 1974. 1 ref.*

A control algorithm was developed which maintains automobile engines at optimum conditions and minimizes exhaust emissions. In the control system, the various detectors are placed on the engine for measuring operating conditions and the various actuators for controlling the parameters of the engine. A mini-computer is used to estimate the best value of such adjustable parameters and to command the actuators. The off line system of the computer is described.

54282 **APTIC NO. 78747**

Hunt, Philip J.

BOILER DESIGN FOR REDUCED EMISSION OF POLLUTANTS. *Natl. Engr., 79(4):6-10, April 1975. 9 refs. (Presented at the Industrial Fuel Conference, West Lafayette, Ind., Oct. 3, 1974.)*

Boiler design techniques for reducing emissions of nitrogen oxides and sulfur oxides are described. The simplest and most economical method to control NOx emissions is the selection of low NOx furnace/burner combination with a large furnace cooling surface. Further NOx reduction is achieved by two stage combustion using overfire air ports or gas recirculation. Sulfur oxides emissions can be controlled by removing sulfur before the fuel is burned, removing sulfur dioxide emissions before thay leave the stack, or controlling these emissions after they have left the stack through dispersion.

54283 **APTIC NO. 78719**

Renault, Philippe, Andre Deschamps, and Claude Dezael

REMOVAL OF THE HYDROGEN SULFIDE CONTAINED IN A GAS OF HIGH CARBON DIOXIDE CONTENT. *(Inst. Francais du Petrole, des Carburants et Lubrifiants, Rueil-Malmaison (France)) U. S. Pat. 3,833,714. 3p., Sept. 3, 1974. 4 refs. (Appl. June 19, 1972, 10 claims).*

A process is described for removing hydrogen sulfide from a gas containing hydrogen sulfide mixed with a large amount of carbon dioxide. It comprises the successive steps of contacting the gas with an aqueous solution of ammonium sulfite so as to form ammonium thiosulfate; decomposing the ammonium thiosulfate to sulfur, ammonia, sulfur dioxide, and water; and recovering the sulfur and recycling the ammonia, sulfur dioxide, and water to the contact zone in order to regenerate the ammonium sulfite solution. (Author abstract)

54284 **APTIC NO. 78698**

Spadaccini, L. J.

LOW EMISSION COMBUSTORS FOR GAS TURBINE POWERPLANTS. *Combustion Sci. Technol., 9(3-4):133-136, 1974. 2 refs.*

A combustor concept which is applicable to gas turbine engines and is believed to offer valuable pollution control advantages was evaluated. Fuel prevaporization, premixing, and lean combustion and may be applied to the design of combustors for aircraft, automobiles, industrial, and powerplants. Several flameholders were tested. Gaseous fuel, either propane or externally vaporized gasoline, was premixed with the high temperature inlet air upstream of the flameholder, and ignited in the flametube. Samples of the combustion gases were withdrawn and analyzed to determine the concentrations of oxides of nitrogen, carbon monoxide, and unburned hydrocarbons (HC). The rates of emission of NOx, CO, and HC were determined as functions of fuel-air ratio. The flameholder design which produced the lowest pollutant emission levels was a drilled plate containing a hexagonal array of 165 counterbored holes of one sixteenth in diameter. Nitrogen oxides emissions increase for increasing temperature, pressure, and equivalence ratio, while HC emissions decrease. The kinetic behavior of the combustion reactions is such that for lean mixtures both the rates of production and oxidation of CO increase with increasing equivalence ratio. Initially the rate of CO oxidation exceeds the rate of production, decreasing CO emissions until equivalence ratios are reached above which the rate of production of CO exceeds the oxidation rate. The data were used to design gas turbine combustors having predicted performance characteristics which are better than those required to meet the 1976 Federal Standards regulating automobile exhaust emissions of NOx, CO, and HC. (Author abstract modified)

54285 **APTIC NO. 78574**

Trilling, C. A.

COAL GASIFICATION BY ATOMICS INTERNATIONAL S ROCKGAS PROCESS. *Preprint, American Society of Mechanical Engineers, New York, 10p., 1974. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, New York, 1974, Paper 74-WA/Pwr-11.)*

The Rockgas process of coal gasification is described. The process uses the partial oxidation of coal in a molten sodium carbonate medium to produce a low-Btu fuel gas for consumption at the site of the gasification plant. The sulfur and ash of the coal are retained in the melt, a sidestream of which is circulated continuously through a regeneration system for regeneration of the carbonate, removal of the ash, and recovery of elemental sulfur. The melt discharge from the molten salt furnace is quenched with water, producing an aqueous slurry and releasing stream for use in the regeneration process. The off gas from the sulfur recovery plant (Claus type) and any other gas streams from the regeneration system which may contain sulfur compounds are recycled to the suction of a primary air compressor. The stack gas from the plant is expected to contain only very small amounts of oxides of sulfur and nitrogen. The capital cost of the Rockgas plant is an estimated $34.1 million; operating costs amount to 5.9 mill/kW-hr. (Author abstract modified)

54286 **APTIC NO. 78718**

Villiers-Fisher, John F.

REMOVAL OF SULFUR DIOXIDE FROM GAS STREAMS. *(Chemical Construction Corp., New York) U. S. Pat. 3,833,711. 7p., Sept. 3, 1974. 4 refs. (Appl. Aug. 14, 1972, 9 claims).*

Sulfur dioxide is removed from a gas stream which initially contains sulfur dioxide and sulfur trioxide, by initially contacting the gas stream with discrete porous solid Particles of an inorganic alkali which may be in equilibrium with respect to sulfur dioxide absorption and which could be primarily alkali sulfite during much of its effective life. The sulfur trioxide component of the gas stream reacts with the inorganic alkali solid, generally displacing any previously absorbed sulfur dioxide, and a second gas stream is produced which is substantially devoid of sulfur trioxide. The second gas stream is scrubbed with a liquid containing an active alkaline component for the absorption of sulfur dioxide, and a final gas stream free of sulfur oxides is produced. The invention prevents the absorption of sulfur trioxide by the scrubbing liquid and thus greatly reduces the build up of sulfates in the scrubbing liquid, which are difficult to regenerate. Thus, a net loss of active alkaline component due to sulfate formation is prevented. (Author abstract)

54287 **APTIC NO. 78573**

Watkins, E. H.

ORGANIC RANKINE CYCLE PROPULSION SYSTEM FOR USE ON A 25-PASSENGER BUS (FINAL REPORT. *Dallas Transit System, Urban Mass Transportation Administration Grant TX-06-0004, Rept. UMTA-TX-06-0004-74-1, 179p., June 1974. 2 refs.*

NTIS: PB 234793

The development and testing of an organic Rankine cycle propulsion system for a 25-passenger bus is described. The propulsion system consisted of a burner heater, turbine engine, regenerator, condenser, feed pump, reduction gearbox, automatic transmission, controls, and all interconnecting piping and drives. The feasibility of the engine was demonstrated during nearly 300 mi of driving, with no appreciable fluid degradation being observed during the testing. The engine met the 1975 Federal heavy duty exhaust emission requirements at all but the 20% engine power setting without extensive combustor development or optimization. Hydrocarbon emissions were below the capabilities of the gas analyzer used (less than 50 ppm). Carbon monoxide emissions ranged from 6.6-14.8 g/brake horsepower-hr, and nitrogen oxide emissions ranged from 0.23-0.3 g/brake horsepower-hr.

54288 **APTIC NO. 78675**

THE EXHAUST PURIFICATION PLANT AT UNIONE DELLA FALCK FOUNDRY. *(L impianto di captazione e depurazione fumi alla Fonderia Unione della Falck). Text in Italian. Fonderia Ital., no. 9:274-276, 1974.*

The ultramodern air purification plant installed January 1974 in the Foundry department of the Unione plant, Falck Company, is the tenth such plant to be installed there since 1968. Handling the exhaust fumes of 2 moderately sized electric furnaces, it can process 145,000 cubic meters of air at 120 C with an efficiency of 25-30 mg/cc. The filter proper measures 26.4 by 18.48 by 4.7 meters and has 8 compartments of 40 special-fabric filter bags each. Other special features provide for easy maintenance and inspection of the inner chamber of the filter complex.

54289 **APTIC NO. 78866**

VDI-Kommission Reinhaltung der Luft

EMISSION CONTROL FROM ZINC GALVANIZING OPERATION. *(Auswurfbergrenzung Feuerverzinkungsanlagen). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, vol. 2579:1-7, Oct. 1974. 26 refs.*

Air pollutant emissions generated at different stages of the hot-galvanizing process, and methods for the collection and separation of these pollutants are described. Hydrochloric acid fog is generated during the pickling process, and salt aerosol emission is due to the use of fluxes composed of zinc chloride and ammonium chloride. Zinc dust is generated during the blowing of tubes before galvanization. Zinc slag is generated on the surface of the zinc baths due to reaction with oxygen. Acid fog formation can be abated by the use of hydrochloric acid with lower concentration, inhibitors, foaming agents, or floating plastic balls. Salt aerosol formation can be reduced by using fluxes with higher zinc chloride content. The waste gases should be exhausted from the immediate vicinity of the place where they are generated in the pickling and galvanizing baths. However, intense oxidation of the zinc bath surface due to increased air exchange should be avoided. The waste gases from the zinc bath area can be cleaned by wet type dust separators, filters, or electrostatic precipitators. Wet type separators are efficient in the removal of particulate matter, aerosols and gaseous components.

54290 **APTIC NO. 78921**

PROTECTION AGAINST DUST IN COAL MINES. *(Ochrona przed zapylenie w podziemiach kopala wegla). Text in Polish. Ochrona Pracy (Prague), 28(8):14-16, Aug. 1974.*

A description is given of the equipment currently used by the Polish coal-mining industry to protect the miners against dust in situations where the use of water for wetting coal is either impossible or undersirable. Six types of suction equipment developed by the Mechanization and Design Works of the Coal Mining Industry in Gliwice are described. These include the following: GOM-1 which is a mobile, wet-filter, fan-operated dust remover, designed for use at dumping and loading points. When equipped with a venturi nozzle, it has an efficiency of more than 99% and a capacity 150-200 cu m per min. The GOS-O and GOS-1 are stationary, wet-filter types and are installed in places where compressed air is available. They have the simplest construction and respective capacities of 0.9-1 and 3.6-6.2 cu m of air per min. The GOP-1, a dry-filter, mobile device working on the vacuum cleaner principle, has a capacity of 6.5 cu m per min and is used to clean mining equipment and installations. The portable, dry-filter, suction-type machine has been developed for use with pneumatic drills to remove dust directly from the hole during the drilling process. The GOW-1 which uses a whirlpool-type wet filter and has a capacity of about 300 cu m per min is currently under development. The individual protective equipment, used in high dust concentration areas, is still the conventional half-mask. Its efficiency is 99% for a dust particle size of 0.15 micron.

1973

54291 **APTIC NO. 78483**

Chamrad, Jiri

EXHALATIONS IN FOUNDRY PROCESSES. *(Exhalace slevarenskych pochodu). Text in Czech. Slevarenstvi, 21(3-4):69-74, 1973.*

The average particle sizes and composition of the solid emissions from cupola furnaces are given. The concentration of the gaseous pollutants depends on the construction of the furnace. In hot air cupolas, the carbon monoxide content is reduced to zero when the gases are passed through a recuperator; in cold-air cupolas, the oxidation of CO is not continuous, and CO escapes intermittently. Elimination of sulfur dioxide requires wet filtration of the flue gases, followed by neutralization with calcium oxide. The present status of removal of pollutants in Czechoslovakian foundries is not satisfactory. Spark arresters are frequently of the dry type which have, at best, an efficiency of 32% and should be replaced by wet arresters (74 % efficiency). Centrifugal dust separators (cyclones) eliminate only 70% of the solids and should be replaced by more efficient types (venturi or electrical precipitators, disintegrators, or wet filers). In electric arc furnaces, a fine particle size ash (85-90% below 1 micron) is produced and its removal by suction has been accomplished at the CKD (Ceskoslovenska Kolben-Danek) plant in Prague. Dust exhaustion, proper ventilation, and leakproof construction of the furnace are absolute prerequisites for hygienic conditions inside the plant.

54292 **APTIC NO. 78598**

Giacomazzi, Roy A. and Max F. Homfeld

THE EFFECT OF LEAD, SULFUR, AND PHOSPHORUS ON THE DETERIORATION OF TWO OXIDIZING BEAD-TYPE CATALYSTS. *Preprint, Society of Automotive Engineers, Inc., New York, 12p., 1973. 5 refs. (Presented at the Society of Automotive Engineers, Automobile Engineering Meeting, Detroit, Mich., May 14-18, 1973.)*

Catalyst durability tests were run to gain additional information on the effects of contaminants on catalyst deterioration. Six different fuels consisting of clear Indolene and Indolene with various amounts of lead, sulfur, and phosphorus added were used with two oxidizing bead catalysts -- platinum and palladium. A special oil was evaluated with both catalysts. Both catalysts showed deterioration with miles, but the platinum catalyst had least deterioration. Increasing lead in fuel increased deterioration. Increasing sulfur did not. Phosphorus, however, was harmful, more so with the platinum catalyst than the palladium. Removing calcium from the oil did not increase deterioration. (Author abstract modified)

54293 **APTIC NO. 78494**

Leggio, Vincent J. and Ron D. Presley

AIR QUALITY AND EQUIPMENT SELECTION STUDY FOR A DRY PROCESS HARDBOARD PLANT. *Forest Products Research Society, Madison Wis., Pollut Abatement Control For. Prod. Ind., 1971-1973, Annu. Meet., 27th, Anaheim, Calif., 1973, 37p. 10 refs. (June 27.)*

Field tests to determine the optimum method of particulate control at a dry process hardboard plant engaged in the processing of hogged wood chips into wood fiber were conducted. Comparisons were made between a wet venturi scrubbing system and a dry inertial collection system. The dry collection system provided a higher collection efficiency for wood fibers and involved the least maintenance problems. The total fiber emissions collected with the dry system amounted to 197.67 lb/hr as compared with 182.60 lb/hr with the scrubber. The dry system also proved to be more compatible with plant operations. The installation cost for the dry system was estimated to be about $436,000 more than that for the wet scrubbing system.

54294 **APTIC NO. 78514**

Lindner, Gosta

METHOD OF CLEANING AND SERVICING AIR SUPPLIES, AND THEIR CONTROL. *(Luftrening och luftforsorjning. Metoder och kontroll). Text in Swedish. Research Inst. of National Defense, Division 1, Sundbyberg, Sweden, Rept. FOA 1, 33p., March 1973. 16 refs.*

Methods and apparatus for cleaning air and waste gases, especially in military facilities and equipment are described, and the physicochemical principles of absorption, adsorption, catalysis, and combustion are presented. Carbon dioxide is removed from the air in a u-boat by absorption in monoethanolamine or lime. Molecular sieves, such as zeolites, are used primarily for the absorption of water vapor and certain gases. Waste air with up to 2% carbon monoxide and hydrogen in u-boats can be destroyed catalytically on hopcalite. Carbon monoxide and nitric oxide in engine exhaust gases can be converted catalytically to CO2 and nitrogen, while unburned hydrocarbons can be oxidized to CO2 and water. Particulate matter can be separated by sedimentation, deflection, centrifugal force, wet separation, or electrostatic precipitation.

54295 **APTIC NO. 78605**

Sewell, J. R.

ASSESSMENT OF SOME SOLID FILTERS FOR REMOVING HYDROGEN SULPHIDE AND SULPHUR DIOXIDE FROM AIR. *Dept. of Scientific and Industrial Research, Lower Hutt (New Zealand) Chemistry Div., Rept. C. D. 2168, 19p., Nov. 1973. 5 refs.*

The performance and applications of a solid filter material using an active form of manganese dioxide precipitated onto sawdust or pumice as a carrier is described. Its absorption capacity for hydrogen sulfide and sulfur dioxide was measured. The material compares favorably with activated charcoal. The possible use of the filters in the treatment of geothermal atmospheres, sewage gases, and other odors is discussed. Assessment of production economics shows that the filter material may be marketed for half the price of a good activated charcoal. (Author abstract modified)

54296 **APTIC NO. 78584**

Vasilescu, Calin Adrian and Mihai Soiman

ON THE ECONOMIC EFFICIENCY OF DIFFERENT SOLUTIONS FOR REDUCING THE POLLUTION PRODUCED BY AUTOMOBILE SPARK IGNITION ENGINES. *(Asupra eficientei economice a diferitelor solutii pentru reducerea poluarii produsa de catre motoarele cu aprindere prin scinteie). Text in Romanian. Transporturi auto, navale si aeriene, 3(20)(9):448-497, Sept. 1973.*

The methods studied are grouped into 4 major categories: reduction of pollutants are the origin; chemical transformation of pollutants; retention of pollutants; and reduction of pollutants by using special fuel. Methods which are economical and do not completely reduce pollution, are: improved admissions; fine pulverization of gasoline; and the Clean Air Package method. Solutions which allow recovery of investments and only partially decrease pollution are: electronic injection with gasoline; injection with gasoline; introducing the fuel mixture by separate pipeline; and ignition from a flame jet. Other solutions, such as injection of air into the exit pipe and Man AIR OX and catalytic installation are more costly, but significantly reduce noxious emissions. In Romania, the most interesting solutions are those which aim at constructive engine modification, because they are economical, easily adaptable to series production methods. Electronic injection with gasoline and related methods allow superior engine performance, allow recovery of investments.

54297 **APTIC NO. 78892**

Yocom, John E.

INCINERATION OF GASES AND VAPORS. *ASHRAE (Am. Soc. Heating Refrig. Air Cond. Engrs.) J., 15(5):43-45, May 1973. 2 refs. (Presented at the Air Pollution Control Symposium, Part II, Chicago, Ill., Jan. 1973.)*

Incineration effectively destroys organic gases, aerosols, and most odorous materials in an exhaust stream in fume incinerators. Flame afterburners have wider application, since catalytic systems can be harmed by inorganic contaminants. Both involve high temperature oxidation. Flame afterburning is used to reduce opacity of plumes, emissions of reactive hydrocarbons, and explosion hazards. It can be used over a wide range of organic gas or aerosol concentrations in the exhaust gas. A temperature of at least 1200 F must usually be achieved in the afterburner in the presence of excess air to completely destroy odors. The fire boxes of direct fired processes can be used as flame afterburners to destroy organic gases and aerosols. The largest portion of the total operating cost in flame combustion is in fuel purchase, except where the contaminated air stream can be introduced into a boiler. This can be reduced substantially by heat exchangers for recovering some of the waste heat. Capital costs for flame afterburners vary widely. Catalytic combustion takes place at much lower temperatures. Because it takes place on exposed surfaces, these surfaces must be kept clean. Gas streams containing low concentrations of inorganic dust can be handled if the elements are washed frequently. First costs for catalytic units are usually higher than flame fired units for the same application, but the lower operating temperature and lower fuel costs for catalytic units permit them to operate more cheaply. When the contaminated stream has heating value, the catalytic method has even greater advantages.

1972

54298 **APTIC NO. 78413**

Freund, E.

STATE-OF-THE-ARET OF OIL BURNERS FOR INDUSTRIAL HEAT SUPPLY. *(Stand der Technik von Oelbrennern fuer die industrielle Waermeversorgung). Text in German. Freiberger Forschungsh A., no.(503):19-33, 1972. 8 refs.*

Recent trends in the development of industrial oil burners, combustion processes and control techniques are outlined. The development toward quasi-stoichiometric combustion conditions leads to a reduction of the sulfur trioxide emissions and consequently of the corrosion hazards. In addition, vanadium is oxidized to lower oxides with higher melting point instead of to pentoxide, which reduces high-temperature corrosion. The development of burners is characterized by a tendency toward a short and concentrated combustion zone with high flame temperature and recirculation of the hot flue gases, without contact with the cold combustion chamber walls. Due to the high combustion, this results in a reduced soot and carbon monoxide formation. Large-capacity firing equipment is increasingl equipped with SO_3 monitors.

54299 **APTIC NO. 78410**

Heuvel, H. M. J. van den

DEVELOPMENT AND EFFECT OF FUEL INHIBITORS. *(Entwicklung und Wirkung von Brennstoffinhibitoren). Text in German. Freiberger Forschungsh A., (503):51-67, 1972.*

A general description is given of the fuel additives and their effects on the combustion process in boilers. Emulsion breakers are used in fuel oil to prevent water from entering the burner, as water droplets explode in the high temperature prevailing in the burner, and entrain oil droplets which then form soot or coke outside the flame. The formation of sulfur trioxide with atomic oxygen is prevented by inhibitors which have greater affinity with atomic oxygen than sulfur dioxide, and prevent the catalytic effect of vanadium pentoxide. Liquid additives can be used also in burners using natural gas or coke-oven gas to prevent sulfur trioxide formation and resulting corrosion.

54300 **APTIC NO. 78704**

Jacob, Siegfried

STUDY OF A POSSIBLE UTILIZATION OF BITUMINOUS COAL WITH HIGHER SULPHUR CONTENT. *(Beitrag zur Verwertung bituminoeser Kohlen mit hoeherem Schwefelgehalt). Text in German. Freiberger Forschungsh. A., vol. 500:39-69, 1972. 135 refs.*

Laboratory and pilot studies on the coking of bituminous coals with high sulfur content to obtain high-sulfur coke for copper smelting are described. The addition of lime for the coking process resulted in an increase in the sulfur content of the coke and in a sharp reduction of the content of hydrogen sulfide and other sulfur compounds in the coke-oven gas due to the formation of calcium sulfide. Practically sulfur-free coke-oven gas was obtained with 10% lime. Primary flue dust and other additives were considerably less efficient regarding the elimination of gaseous sulfur compounds. The high-sulfur coke was found to be suitable for use in copper smelting.

MEASUREMENT METHODS

1975

54301 **APTIC NO. 78696**

Bonczyk, P. A.

APPARATUS FOR LOCAL SENSING OF NITRIC OXIDE AS A POLLUTANT. *Rev. Sci. Instr., 46(4):456-458, April 1975. 20 refs.*

An apparatus for detecting 1/4 ppm of nitric oxide in a NO-nitrogen mixture is described. It consists of a carbon monoxide laser, which emits radiation that is absorbed by the NO in the mixture. The amount of absorption is proportional to the concentration of NO present. Optimum detection sensitivity is achieved when the mixture is situated in a magnetic field. The field shifts the absorption wavelength of the NO into coincidence with the fixed laser wavelength. (Author abstract modified)

54302 **APTIC NO. 78751**

Byerly, Radford

NEW DEVELOPMENTS IN THE MEASUREMENT OF GASEOUS POLLUTANTS IN AIR. *IEEE Trans. Nucl. Sci., NS-22(2):856-869, April 1975. 20 refs.*

New developments in the measurement of gaseous pollutants in air are described. Specific techniques include: chemiluminescence, fluorescence, open path optical methods, diode lasers, perturbation spectroscopy, and piezoelectric detector. Any instrumentation developed for air pollution monitoring must meet the criteria of simplicity, specificity, and sensitivity. The Environmental Protection Agency demands that any instrument meet the performance standards if the instrument is to be used in the stage programs to achieve the National Air Quality Standards. (Author conclusions modified)

54303 **APTIC NO. 78948**

Cecchetti, G., A. Altieri, and G. Carelli

DETERMINATION OF TOTAL PARTICULATE SULFUR IN THE ATMOSPHERE BY MEANS OF X-RAY FLUORESCENCE SPECTROMETRY. *(Determinazione* *per mezzo della spettrometria di fluorescenza X dello zolfo totale particellare nell aria). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):419-430, 1973. 12 refs.*

The quantitative determination of particulate total sulfur using X-ray fluorescence spectrometry on samples of aerosols taken from micropore filters is described. Calibration curves are plotted from single suspensions containing known quantities of matrix consisting of calcite and S as cadmium sulfide. The S signal changes concomitantly with the variation in the total amount of matrix present. The calibration curves are used in the analysis of atmospheric particulate total S.

54304 **APTIC NO. 78938**

Chiu, S-t and L. Paszner

POTENTIOMETRIC TITRATION BEHAVIOR OF SODIUM SULFIDE, METHYL MERCAPTAN, DIMETHYL SULFIDE, DIMETHYL DISULFIDE AND POLYSULFIDES IN MIXED ALKALINE SOLUTIONS AND SULFATE PULPING BLACK LIQUORS. *Anal. Chem., 47(12):1910-1916, Oct. 1975. 30 refs.*

The potentiometric titration behavior of sodium sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and polysulfides in mixed alkaline solutions and sulfate pulping black liquors was investigated. Potentiometric titration of mercaptan fortified sulfate black liquors yields up to three inflection points corresponding to potential drops due to monosulfide, organic/inorganic polysulfide (bound mercaptan), and ionized free mercaptan. In normal mill run black liquor, most of the mercaptide ion is bound by traces of elemental sulfur to form organo-polysulfide usually present in oxidized black liquors. Determination of methyl mercaptan by potentiometric titration is very difficult. Correct interpretation of the titration curves is crucial in the sulfide analysis of black liquors. Thiolignin has no measurable effect on the outcome of potentiometric titration of sulfides in black liquor. (Author abstract modified)

54305 **APTIC NO. 78431**

Clay, David T. and Scott Lynn

PRETREATMENT OF MOLECULAR SIEVE 5A TO ELIMINATE TAILING OF NITRIC OXIDE. *Anal. Chem., 47(7):1205-1206, June 1975. 3 refs.*

A pretreatment procedure for a molecular sieve 5A column to eliminate tailing of nitric oxide is proposed. The procedure consists of these steps: activate the sieve by heating to 300 C under vacuum for 20 hr to desorb all bases; break the vacuum at 300 C with NO, maintaining a low NO flow for 1 hr to saturate the column; cool the column to 20 C while continuing to saturate with NO for another hour; flush the column with helium for 1/2 hr to remove all nonadsorbed NO. Add a stream of oxygen at 25 C to form nitrogen dioxide on the active sites; raise the temperature to 100 C while maintaining the O2 atmosphere and hold for 1/2 hr to ensure than O2 and NO react; and heat the column to 250 C under a He atmosphere for 8 hr.

54306 **APTIC NO. 78851**

Confer, Robert G.

A UV-CONDUCTIVITY METHOD FOR DETERMINATION OF AIRBORNE LEVELS OF VINYL CHLORIDE. *Am. Ind. Hyg. Assoc. J., 36(7):491-496, July 1975. 2 refs.*

A method has been developed for the measurement of vinyl chloride based on the decomposition of vinyl chloride and the subsequent measurement of the conductivity of the decomposition products in deionized water. Air containing vinyl chloride is sampled through a glass flask containing an ultraviolet lamp. The sample rate for efficient conversion of the vinyl chloride to conductive materials is 2 l per min. The wavelength of the ultraviolet light is 2537 angstroms. The sampled air is then drawn through deionized water, the decomposition products are absorbed, and the resulting conductivity measured. Vinyl chloride concentrations of less than one tenth of a part per million can be detected by the method. (Author abstract modified)

54307 **APTIC NO. 78849**

Daley, Peter S. and Dale A. Lundgren

THE PERFORMANCE OF PIEZOELECTRIC CRYSTAL SENSORS USED TO DETERMINE AEROSOL MASS CONCENTRATIONS. *Am. Ind. Hyg. Assoc. J., 36(7):518-532, July 1975. 20 refs.*

Aerosol mass concentration determination using piezoelectric crystal sensors was investigated. Five areas of influence were studied: temperature, humidity, particle collection characteristics, response linearity, and mass sensitivity. A theoretical review is included. Two piezoelectric crystal sensors, differing fundamentally in the means of particle deposition on the electrode surface, were used. The methods of generating aerosols and controlling humidity and temperature are discussed. Neither air stream temperature nor humidity fluctuations were compensated by the use of a reference crystal. The temperature induced error was satisfactorily reduced by minimizing the inlet temperature change rate. The humidity induced error resulted principally from moisture absorption and desorption by the aerosol deposit. The observed linear response limits ranged from 0.2 to 6 microgram per sq mm for various aerosols and instrument designs. No relationship between the linearity limit and the point of complete saturation was apparent. The mass sensitivity was a function of the deposit size and location. Energy trapping theory helped to predict the mass sensitivity distribution. The mass sensing ability decreased for particle sizes beginning at approximately 2 micron diameter, reaching essentially zero at 20 micron. The use of viscous crystal coatings appeared to improve the sensing ability in the 2 to 20 micron size range. (Author abstract modified)

54308 **APTIC NO. 78798**

Ebing, W. and G. Hoffmann

GUIDELINES FOR THE SAMPLING OF SOILS FOR EXAMINATION FOR TRACES OF ORGANIC AND INORGANIC ENVIRONMENTAL CONTAMINANTS THAT ARE OF INTEREST WITH REGARD TO THE ENVIRONMENT. *(Richtlinie zur Probenahme von Boeden, die auf Spuren organischer oder anorganischer Fremdstoffe von Umweltschutzinteresse untersucht werden sollen). Text in German. Fresenius Z. Anal. Chem., 275(1):11-13, 1975.*

Uniform guidelines are given for soil sampling and sample treatment for the analysis of environmental contaminants in soil. The guidelines are based upon DIN specifications, and upon the Book Methods of the Association of German Agricultural Investigating and Research Institutions. The soil horizons from which samples are to be taken are determined as a function of the type of the soil and its use. Mixed samples should be prepared from at least 30 individual soil samples from a surface area not greater than 1 ha. The mixed sample must weigh at least 1 kg. The mixed sample should be sent to the laboratory immediately. There, the sample is mixed intensely. The sample size shall be 500 g for inorganic traces, and 1 kg for organic contaminants. Samples to be analyzed for organic contaminants must be kept at -20 C until they are analyzed. The analytical data must be given for water-free soil.

54309 **APTIC NO. 78816**

Elias, Lorne

AIRBORNE GC ANALYZER FOR STUDY OF PESTICIDE VAPOR DRIFT. *J. Chromatographic Sci., 13(4):178-181, April 1975. 6 refs. (Presented at the Canadian Chemical Conference, 56th, Montreal, Quebec, June 3-7, 1973.)*

The vapor drift associated with pesticide spraying operations was measured with a gas chromatograph equipped with an electron capture detector and a flame photometric detector mounted on a Beech 18 aircraft. Outside air is continuously drawn through a heated inlet tube and 10 cu cm portions of the stream are injected into the partition column via a six port sampling valve. In field trials monitoring commercial spraying operations, the instrumentation is capable of indicating concentrations as low as 1 microgram/cu m of the chlorinated herbicide 2,4-D butyl ester in less than 5 min. Bypassing the column and injecting air samples directly into the flame photometric detector allows rapid sensing of the phosphorus containing insecticides fenitrothion and phosphamidon at concentration levels down to 50 micrograms/cu M. (Author abstract modified)

54310 **APTIC NO. 78752**

Evans, Kenneth P., Alan Mathias, Norman Mellor, Raymond Silvester, and Albert E. Williams

DETECTION AND ESTIMATION OF BIS(CHLOROMETHYL)ETHER IN AIR BY GAS CHROMATOGRAPHY--HIGH RESOLUTION MASS SPECTROMETRY. *Anal. Chem., 47(6):821-824, May 1975. 9 refs.*

A method for the detection and estimation of bis(chloromethyl)ether (BCME) in air by a gas chromatography-high resolution mass spectrometry is described. The method involves mass fragmentographic monitoring of the ion m/e 78.9950 (C2H4OCl+) from BCME. The method is applicable down to levels of 0.1 ppm v/v BCME on a 1-liter air sample or 0.01 ppb v/v BCME if a 10-liter air sample is taken. The method is successful in applications in manufacturing plant atmospheres and in reaction headspaces in laboratory and manufacturing processes. (Author abstract modified)

54311 **APTIC NO. 78901**

Fuchs, N. A.

SAMPLING OF AEROSOLS. *Atmos. Environ., 9(8):697-707, Aug. 1975. 33 refs.*

Methods of representative aerosol sampling are reviewed. Topics discussed include: the sampling of flowing and stationary aerosols, techniques for vertical and horizontal duct sampling, indoor and outdoor ambient aerosol sampling techniques, aerosol sampling probes, factors affecting sampling efficiency, and the value of using the aspiration coefficient as a function of the aerodynamic sampling conditions, the inertial particle parameter, and particle diffusivity. The use of a spherical probe is specifically recommended for the sampling of stationary aerosols. Calibration requirements and sampling point locations for various situations are also discussed.

54312 **APTIC NO. 78850**

Gelman, C. and J. C. Marshall

HIGH PURITY FIBROUS AIR SAMPLING MEDIA. *Am. Ind. Hyg. Assoc. J., 36(7):512-517, July 1975. 5 refs.*

High purity, low background filters are needed to measure low concentrations of metal levels in suspended particulate matter. Candidate materials chosen for experimentation were three different types of glasses and two different types of quartz fibers. Types of glass other than spectrograde were unacceptable because of high metal compound content. Quartz fibers also contained zinc and lead, and filter paper made with quartz fibers had less than the desired tensile strength. A filter paper combining quartz and glass fibers had reasonable tensile strength and lower levels of many metal compounds. Filter paper made with spectro fibers gives a low amount of metallic extract and has a higher tensile strength than many other materials. The possibility of sulfur dioxide being picked up form the atmosphere by the filter was investigated. Quartz was found to be nonreactive. Glass fibers prepared with sulfuric acid were low in SO2 pickup. Spectro grade glass, prepared with hydrochloric acid, picked up significant amounts of SO2.

54313 **APTIC NO. 78744**

Grosjean, Daniel

SOLVENT EXTRACTION AND ORGANIC CARBON DETERMINATION IN ATMOSPHERIC PARTICULATE MATTER: THE ORGANIC EXTRACTION--ORGANIC CARBON ANALYZER (OE-OCA) TECHNIQUE. *Anal. Chem., 47(6):797-805, May 1975. 46 refs.*

A method for the determination of organic carbon in atmospheric aerosols is described. It consists of organic solvent extraction of samples collected on glass fiber filters followed by organic carbon analyzer analysis of the concentrated extracts as suspension in water. The organic solvent is removed in the vaporization zone and the aerosol organic C is measured in the combustion zone or an organic C analyzer. Twenty-six solvents and 24 binary mixtures were studied for their ability to extract aerosol organics. From 95 to 100% of the aerosol organic C is extracted and measured by the proposed method. (Author abstract modified)

54314 **APTIC NO. 78771**

Hall, A. W., J. W. Martin, R. F. Stewart, and A. M. Poston

PRECISION TESTS OF NEUTRON SULFUR METER IN COAL PREPARATION PLANT. *Morgantown Energy Research Center, Morgantown, W. Va., Bureau of Mines R I 8038, 15p., 1975. 7 refs.*

A neutron meter was developed for monitoring the sulfur content of coal streams. Neutrons from 80 micrograms of Californium-252 penetrate the coal, producing thermal neutrons that are captured by atoms of elements present in the coal. The excited atoms emit prompt gamma rays with energies characteristic of the capturing element. These gamma rays are detected with a sodium iodide detector and processed by electronic equipment to produce a gamma ray energy spectrum of the elements. Tests of the meter at a commercial coal preparation plant show that sulfur in moving coal can be determined to a precision of 0.05% S within 2 min. Reliability of the coal handling system is inadequate for long term operation. (Author abstract modified)

54315 **APTIC NO. 78917**

Heidel, Robert H. and George A. Desborough

LIMITATIONS ON ANALYSIS OF SMALL PARTICLES WITH AN ELECTRON PROBE: POLLUTION STUDIES. *Environ. Pollut., 8(3):185-191, April 1975. 5 refs. (Presented at the Rocky Mountain Spectroscopy Conference, Annual, 15th, Denver, Colo., Aug. 20-21, 1973.)*

Limitations on the analysis of small particles using an electron probe were determined using airborne lead particles in automotive exhaust emissions. In order to identify Pb with a reliability at 2 sigma (95% conference level) for writing a molecular formula in any of 14 Pb compounds in exhaust gas used as standards, the Pb concentration has to differ by 10.8 wt% Pb absolute between each of the compounds. Similarly, for the chlorine in the five chlorine containing compounds, Cl2 differences have to be 8.0 wt% absolute. The Pb and Cl2 differences in some of the Pb compounds are considerably less than this amount. Standardization cannot be set up for probe analysis and it is not possible to obtain meaningful quantitative values with any degree of precision on a 0.25 micron particle. (Author conclusions modified)

54316 **APTIC NO. 78426**

Hermann, Peter

THE CHEMICAL ANALYSIS OF SMALL FLUORIDE CONTENTS IN SOLIDS AND IN CASE OF EMISSION MEASUREMENTS. *(Zur chemischen Analyse geringer Fluorgehalte in Feststoffen und bei Emissions-messungen). Text in German. Z. Ziegel-, Steinzeug- Ind., vol. 4:142-145, 1975. 11 refs.*

Fusion processes for the determination of small fluoride contents in solids are compared. Alkaline oxidizing fusion with subsequent distillation and the pyrohydrolytic fusion process produce the same results. The photometric determination of fluoride ions in distillates from these solid fusions is made using alizarin complexon with a fluoride ion sensitive electrode fitted into a semi-automatic type of equipment. Adsorption solutions from emission measurements are similarly determined according to the two analytical processes. The equal validity of the two methods of analysis is demonstrated by a random sampling of 30 solutions. Detailed instructions are given on the pyrohydrolytic fusion of solids and also on measurement with fluoride ion sensitive electrodes, including semi-automatic operation.

54317 **APTIC NO. 78762**

Huygen, C.

A SIMPLE PHOTOMETRIC DETERMINATION OF SULPHURIC ACID AEROSOL. *Atmos. Environ., 9(3):315-319, March 1975. 5 refs.*

A simple photometric determination of sulfuric acid aerosol in a polluted atmosphere is described. The acid is collected on a filter and neutralized in situ by a gaseous reactant, diethylamine. The amount absorbed is determined photometrically. The detection limit is 0.2 micrograms/cu m. The reproducibility is 10%. Other acidic particles interfere to a 20% extent, depending on acid strength and physical state. (Author abstract modified)

54318 **APTIC NO. 78970**

Ito, Tadashi, Hiroshige Kaji, Nobuniko Nakano, and Kazuo Kimura

ANALYSIS OF FORMALDEHYDE IN EXHAUST GAS BY A REDUCTION F.I.D. METHOD. *(Kangen F.I.D. ho ni yoru ha ki gasu chu horumuarudehido no bunseki). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 591-596, 1975. 6 refs. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

The reduction flame ionization detector (FID) method was applied to the determination of formaldehyde in automotive exhaust gas by gas chromatography. By the proper selection of the column and by modification of analysis conditions, the HCHO concentration can be measured with high sensitivity and accuracy. Using Porapak N and Carbosieve B columns and nickel catalyst as the reduction catalyst, the HCHO concentration can be determined in six min at column temperature 145 C, injection port temperature 280 C, catalyst temperature 350 C, nitrogen flow rate 30 ml/min, and hydrogen flow rate 40 ml/min. The interfering carbon monoxide and carbon dioxide were separated completely by selecting suitable analysis conditions. The HCHO is readily soluble in water, and the water condensation in the sampling line has a marked effect on the determination. Therefore, the sample syringe and gas sampler were maintained at a constant temperature for accurate measurement. The required 30 min purging before the next measurement is a possible disadvantage.

54319 **APTIC NO. 78436**

Jepsen, Anders

DYNAMIC MEASUREMENTS TO MAP AND PREDICT YOUR AIR POLLUTION PLUME. *Pulp Paper Can., 76(4):57-60, April 1975. 1 ref.*

The use of dynamic measurements to map and predict air pollution plumes is discussed. Dynamic monitoring is the acquisition of data with moving sensors. A complete control system consists of several air pollution and meteorological monitors, data telemetry, a central minicomputer, peripheral display units, and data storage devices. The computer program studies the inputs, calculates the net air quality conditions, displays it in map and tubular form, puts out the appropriate operating instructions and stores all the data on magnetic tape. The effectiveness of the dynamic model depends on the accuracy with which it predicts the air quality levels. The system operates on the basis of forecasting and prediction. It is possible to input the regular weather forecast obtained from independent weather services and to plan operations as much as a day in advance. The methods are applicable to all kinds of stationary sources including pulp and paper mills.

54320 **APTIC NO. 78655**

Karmarkar, K. G., L. M. Webber, and G. G. Guilbault

MEASUREMENT OF SO2 IN AIR USING COATED PIEZOELECTRIC CRYSTAL DETECTORS. *Environ. Letters, 8(4):345-352, 1975. 6 refs.*

A piezoelectric crystal detector apparatus for the measurement of ambient sulfur dioxide is described. The device uses 9 megaHertz AT-cut quartz crystals with silver-plated metal electrodes on both sides. The quartz crystals are coated with Quadrol which renders them sensitive to SO2. Hydrophobic membrane filters are employed to reduce the interfering effect of moisture on SO2 determinations. Sulfur dioxide is measured in terms of the decrease in the frequency of vibration of the oscillating crystal after adsorption of the foreign material on its surface. Sulfur dioxide levels as low as 1 ppb can be detected with the device when dry nitrogen is used as the carrier gas; the detection limit in the presence of moisture is 0.1 ppm. Instrument response is linear from 10 ppb to 10 ppm SO2 for 10 ml samples.

54321 **APTIC NO. 78758**

Katayama, Nobuki and J. W. Robinson

FEASIBILITY OF THE DETERMINATION OF ATMOSPHERIC POLLUTION LEVELS OF ETHYLENE BY LASER INDUCED INFRARED FLUORESCENCE. *Spectrosc. Lett., 8(1):61-70, 1975. 23 refs.*

The concentration dependence of ethylene fluorescence induced by a carbon dioxide laser emitting at 10.6 micron was investigated. The intensities of three different fluorescence bands of ethylene at 10.4, 7.2, and 5.3 micron were compared. The analytical sensitivity for the detection of ethylene fluorescence by this technique is approximately 0.1% for the 10.4 micron band in air. The sensitivity is too high for direct detection at normal pollution levels. Increasing the path length of the lower beam greatly increases sensitivity, while the use of a higher power laser (over 30 watts) and a better detection system lowers the sensitivity to the required analytical range for ambient air monitoring. In separate experiments, ethylene fluorescence was measured in different atmospheres such as air, nitrogen, helium, and argon at atmospheric pressure and at lower pressure. The quenching efficiencies of these molecules varies significantly.

54322 **APTIC NO. 78669**

Kirsh, A. A., I. B. Stechkina, and N. A. Fuchs

EFFICIENCY OF AEROSOL FILTERS MADE OF ULTRAFINE POLYDISPERSE FIBRES. *J. Aerosol Sci., 6(2):119-124, 1975. 20 refs.*

A method of calculation of the efficiency of aerosol filters made of ultrafine fibers in the range of maximum particle penetration is proposed. The fiber collection efficiency due to diffusion and interception of particles is evaluated allowing for the gas slip near the fiber surface, fiber polydispersity, and structure nonuniformity of filters. The efficiency of Whatman GF/A filter is in fair agreement with experimental data. The production of reproducible monodisperse aerosols and the measurement of their size and concentration is of practical importance as such particles show greatest penetration through filters made of ultrafine fibers at the standard face velocity of 10-.5 cm/sec. (Author abstract modified)

54323 **APTIC NO. 78637**

Kneebone, B. M. and Henry Freiser

DETERMINATION OF CARBON DISULFUDE IN INDUSTRIAL ATMOSPHERES BY AN EXTRACTION-ATOMIC ABSORPTION METHOD. *Anal. Chem., 47(6):942-944, May 1975. 13 refs.*

Two new methods for the determination of carbon disulfide in industrial atmospheres are described. The first is a potentiometric method based on the reaction of CS2 with pyrrolidine to form the dithiocarbamate and its subsequent reaction with copper to form a chelate. The disappearance of Cu 2+ is monitored with a solid state Cu electrode. The second method is based on the same reaction, but the chelate is extracted into isoamyl acetate and determined directly via atomic absorption. The detection limit of the two methods is 7.0 micrograms CS2/sample. The sensitivity can be improved at least fivefold by reducing the volume of the extracting solvent to 2.0 ml and extended even further by using an atomic absorption spectrophotometer with greater sensitivity.

54324 **APTIC NO. 78888**

Kraus, Franz-J.

A METHOD FOR THE CONTINUOUS DETERMINATION OF DISTRIBUTION PARAMETERS OF AEROSOLS. *(Eine Moeglichkeit zur Zeitkontinuierlichen Bestimmung von Verteilungsparametern an Aerosolen). Text in German. Staub, Reinhaltung Luft, 35(6):234-237, 1975, 5 refs.*

Two optical aerosol test methods (light scattering and transmitted light measurements), and a measurement method based upon the small ion superposition on aerosol particles were investigated. Actual measurements were done on monodispersed paraffin aerosol particles. The combination of the measurement data obtained for identical aerosol samples by the three different test methods simultaneously furnishes information on the numerical concentration and particle size distribution of the aerosol sample. The parameter determined by measurement based upon the small ion superposition effect is a function of the concentration and diameter of the aerosol particles. With knowledge of the probability distribution function, ii is possible to determine the concentration, mean value, and the variance of polydispersed aerosols by the above method.

54325 **APTIC NO. 78403**

Lautner, William K. and Gerald T. Fisher

RAGWEED POLLEN GENERATION AND SAMPLING METHODS FOR FILTRATION STUDIES. *Am. Ind. Hyg. Assoc. J., 36(4):303-310, April 1975, 9 refs.*

The means of generating and measuring the concentration of ragweed pollen particles for air filtration studies is discussed. An inexpensive in-line impaction type sampler was developed which collects the sample on filter paper. Ragweed pollen concentrations of 20 micron diameter are measured. The most acceptable method of obtaining particle concentrations on the probe filter is to count the entire field of 500 to 1000 particles. For this type of filtration apparatus it is irrelevant to require air sampling rates at isokinetic probe velocities. The best method of dispersing a pollen sample is to use an S-shaped glass tube attached to a rubber bulb, which gives good intermittent dispersion. (Author conclusions modified)

54326 **APTIC NO. 78764**

Law, S. Edward

ELECTROSTATIC INDUCTION INSTRUMENTATION FOR TRACKING AND CHARGE MEASUREMENT OF AIRBORNE AGRICULTURAL PARTICULATES. *Trans. ASAE (Am. Soc. Agr. Engrs.), 18(1):40-45, Jan.-Feb. 1975, 5 refs.*

Electrostatic induction was developed as the basis of operation for non-contact sensing of the passage of single airborne particulates. Toroid shaped electrodes positioned at known distances detect the presence of slightly charged particles as they move along an effective travel zone of approximately 13 cm diameter. Particles with charges on the order of 10 to the -10th coulombs induce transient currents in the picoampere range onto the sensing electrodes. Electrometer amplification and storage oscilloscope recording permit peak to peak time measurements of successive induction signals from all electrodes to determine time displacement data for airborne particles. Induction current signal strength increases linearly with particle charge. Signal strength decreases approximately linearly as the electrode diameter is made larger, and it increases slightly as electrode surface area is increased. (Author summary modified)

54327 **APTIC NO. 78502**

Levadie, Benjamin

DUST COUNTING. CRITICAL REVIEW AND PRESENTATION OF VERMONT PRACTICE. *Sci. Total Environ., vol. 3:235-247, 1975, 42 refs.*

A review of manual dust counting procedures is presented along with a description of a more reliable technique which uses a thin hemocytometer cell. Respirable dust particle counting using bright field microscopy is beset with difficulties associated with variations in optical systems and counting cells used by various laboratories. Many of the disadvantages of classical dust counting procedures can be overcome by the use of a hemocytometer method of dust counting. The sampling is accomplished with portable air pumps capable of drawing 1 cu ft/min of air through a Greenburg-Smith impinger. Preparations are simple, and the cell grid ruling is such that the center-to-center distance bbetween the outside pair of the triplet boundary lines is 2 micron. The space between any two adjacent inscribed lines in a triplet is 2.5 micron. The mean width of the engraved line is approximately 0.5 micron, permitting rough particle size discriminations during counting. A Zeiss binocular microscope equipped with a resolving substage capable of providing phase contrast interference filters and dark field illumination is used for the magnification.

54328 **APTIC NO. 78446**

Malissa, H. and M. Grasserbauer

THE SIGNIFICANCE OF PHYSICAL MICRO-METHODS IN THE INVESTIGATION OF DUSTS. *(Die Bedeutung physikalischer Mikromethoden zur Untersuchung von Staeuben). Text in German. Mikrochim. Acta, 1975 II(3):325-342, 1975, 32 refs.*

The possibilities of using physical micro-methods for the determination of the average composition of dusts, including a review of the analytical problems raised by the study of solid substances that pollute the air, are discussed. The identification of individual dust components and substances and the determination of the morphology of dust particles are also discussed.

54329 **APTIC NO. 78650**

Meinel, H.

DETECTION OF NITRIC OXIDE BY THE RESONANCE ABSORPTION TECHNIQUE. *Z. Naturforsch., 30(3):323-328, March 1975, 28 refs.*

A resonance absorption technique for the detection of ppm concentrations of nitric oxide in ambient air or internal combustion engine exhaust is described. Detection is achieved by measuring the average absorption of the source emission lines due to the same transition in the absorbing gas sample. The averaging procedure is performed over the entire molecular band with the relative emission intensities of the individual rotational lines as weight factors. A hollow cathode discharge is used as the source lamp and operates in streaming air at a discharge current of about 1 milliampere. Nitric oxide detection is accomplished with a double-beam technique using single-beam optics.

54330 **APTIC NO. 78906**

Mori, Masaki and Shonosuke Ito

CONCENTRATION DETERMINATION METHOD FOR NITROGEN OXIDES. *(Chisso sankabutsu no nodo sokutei ho). Text in Japanese. (Denki Kagaku Keiki K.K. (Japan)) Japan. Pat. Sho 50-17157, 5p., June 18, 1975. (Appl. March 23, 1970, 1 claim).*

A colorimetric determination method was applied to the measurement of nitrogen oxides (nitric oxide, nitrogen dioxide) in flue gas. A sample cell is connected to a gas inlet and an oxygen bomb by conduits with valves. The sample gas containing NO is led into the sample cell and sealed; NO is oxidized to NO2 by injecting the pressurized oxygen into the cell. After the oxidation of NO to NO2, the absorbancy is measured. The sample gas containing 520 ppm of NO was oxidized completely in five min under 5 kg/sq cm pressure. Simplicity of apparatus and extremely high accuracy characterize this method. The measurement can be made automatically by the use of solenoid operated valves.

54331 **APTIC NO. 78803**

Nakano, K. and K. Masuda

COMPARISON OF MEASURING DEVICES FOR NON-METHANE HYDROCARBON. *(Hi-metan tankasuiso sokuteiki no hikaku). Text in Japanese. Tokyo-To Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 6:43-54, 1975.*

Comparison was made between five non-methane hydrocarbon detectors including a Beckman model 6800, a Yanagimoto AG200 model, a Shimazu HCM-3A model, a Norimoto Bendix 8201 model and a Nichiden-Varian model. the Shimazu HCM-3A model showed the smallest maximum span variation of 0.9%/day while the Norimoto Bendix 8201 model showed the greatest maximum span variation of 2.24%/day for methane. The Beckman model 6800 and the Shimazu HCM-3A model showed excellent linearity between the concentrations of the standard samples and the observed values, with standard deviation less than 5%. Results of propane response experiments showed that the response ratios ranged from 105% for the Shimazu HCM-3A model to 65.4% for the Norimoto Bendix 8201 model. Measurements in the atmosphere revealed that the indicating values for non-methane hydrocarbons varied remarkably with the apparatus, and the discrepancies could not be explained just by carbon response.

54332 **APTIC NO. 78876**

Osaka, Kuniichi

PRESENT STATUS AND FUTURE PROBLEMS IN JIS POLLUTION MEASUREMENTS. *(Kogai keisoku JIS no genjo to kongo no kadai). Text in Japanese. Hyojunka To Hinshitsu Kanri (Stand. Qual. Control), 28(3):5-13, March 1975.*

The present JIS air pollution measurements have 7 general rules dealing with units, principles, reagents, standard apparatus, records and operating methods, 11 guidelines dealing with standard substances, 1 flue gas sampling method, 20 analytical methods for harmful gases, 6 guidelines dealing with dust collectors and analysis of particulates, 7 guidelines dealing with cleaning devices and analysis of carbon monoxide and carbon dioxide in the automobile exhaust, and 4 guidelines dealing with automatic measuring apparatus for CO, sulfur oxides, nitrogen oxides and airborne particulates. Solution conductivity method, non-dispersive infrared spectrometry, gravimetric or light scattering method, spectrophotometry using Saltzman reagent, and spectrophotometry using potassium iodide solution are used for the analysis of sulfur dioxide, CO, airborne particulates, nitrogen dioxide, and photochemical oxidants, respectively, for environmental standards. Cadmium and lead in flue gases are determined by atomic absorption, spectrophotometry and polarographic method while chlorine and hydrogen chloride are determined by o-toluidine method and mercuric thiocyanate.

54333 **APTIC NO. 78510**

Owusu, Joshua K. and Robert M. Bethea

SCREENING TECHNIQUE FOR HAZARDOUS METALLIC COMPOUNDS IN PARTICULATE STACK EFFLUENTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 16 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-33.1.)*

A rapid screening technique for hazardous metallic compounds in particulate stack effluents was developed for the oxides of antimony, iron, chromium, nickel, vanadium, tin, and silver. The qualitative procedures, originally based on standard geochemical and quantitative analysis methods are modified to conform to the anticipated lower detection limits required for the screening particulate stack samples obtained as a result of emission or compliance testing. Solubilization is achieved by digestion in 0.5 N nitric acid followed by selective solubilization of copper oxide, ferrous oxide, ferric oxide, and vanadium pentaoxide in hot 3 N nitric acid and the final solution of beryllium oxide and antimony oxide in hot concentrated sulfuric acid. Subsequent cation separation is obtained by complex forming extractions in suitable solvents at an appropriate pH. (Author abstract modified)

54334 **APTIC NO. 78949**

Pierce, Ronald C. and Morris Katz

DETERMINATION OF ATMOSPHERIC ISOMERIC POLYCYCLIC ARENES BY THIN-LAYER CHROMATOGRAPHY AND FLUORESCENCE SPECTROPHOTOMETRY. *Anal. Chem., 47(11):1743-1748, Sept. 1975. 16 refs.*

A thin layer chromatographic procedure was developed for the fractionation of three isomeric groups of polycyclic arenes present in ambient particulate matter. It involves a preliminary group separation on aluminum oxide followed by resolution of the arenes on acetylated cellulose. A total of 12 polycyclic arenes: five pentacyclic, two C22 hexacyclic, and five C24 hexacyclic arenes, were quantitatively resolved. Two dimensional thin layer chromatography on a composite plate of aluminum oxide: 40% acetylated cellulose also used for identification purposes. Thin layer chromatography coupled with fluorescence spectrophotometry is an effective analytical technique for the determination of isomeric polycyclic aromatic hydrocarbon content in atmospheric aerosols. (Author abstract modified)

54335 **APTIC NO. 78779**

Raymond, A. and G. Guiochon

THE USE OF GRAPHITIZED CARBON BLACK AS A TRAPPING MATERIAL FOR ORGANIC COMPOUNDS IN LIGHT GASES BEFORE A GAS CHROMATOGRAPHIC ANALYSIS. *J. Chromatographic Sci., 13(4):173-177, 1975. 17 refs.*

The use of graphitized carbon black as a trapping material for organic compounds in light gases before a gas chromatographic analysis is described. Graphitized carbon black is a powerful, nonselective adsorbent. It does not retain water and light gases practically, has a chemically inert surface and is stable at high temperatures. Acceptable quantitative trapping efficiencies of dimethylphthalate and trimethylphosphate on graphitized carbon black are obtained at concentrations between .02 and 4.5 ppm in dry nitrogen. Graphitized carbon black is suitable for gas chromatographic analysis of atmospheric pollutants, aromas, odors, and any trace substances in gases. It is used extensively in systematic measurements of the concentration of pollutants in the C7-C20 range in the atmosphere of Paris.

54336 **APTIC NO. 78919**

Robinson, J. W. and W. M. Reid

DETECTION AND DETERMINATION OF SULFURIC ACID AEROSOL - DIFFICULTIES IN TRAPPING. *Environ. Letters, 8(4):361-369, 1975. 7 refs.*

The efficiencies of various filtering agents used for the determination of sulfuric acid aerosol as generated from a platinum catalyst were measured. The Fluoropore filter, which has been recommended as a filter device for removing sulfuric acid aerosol from the atmosphere, is only able to scrub out approximately 1% of the sulfuric acid which passes through it. Any method using this filter as the scrubbing device is totally unac-

ceptable an an analytical technique for the determination of sulfuric acid aerosol in the atmosphere. Sulfuric acid is extremely difficult to trap in simple aqueous solutions.

54337 **APTIC NO. 78731**

Saltzman, Bernard E. and John E. Cuddeback

AIR POLLUTION. ***Anal. Chem., 47(5):1R-15R, April 1975. 500 refs.***

A review of literature from mid 1972 to late 1974 dealing with air sampling and analysis is presented. Topics covered include: gaseous and particulate sampling procedures and devices, the sizing of aerosols, various analytical techniques for gaseous and particulate air pollutants, biological indicators, source analyses involving stack sampling and monitoring, remote sensing techniques, the evaluation and standardization of field studies, and data handling systems.

54338 **APTIC NO. 78797**

Schaffernicht, H.

THE USE OF SEMICONDUCTOR GAS DETECTOR TGS (TAGUCHI GAS SENSOR) FOR OCCUPATIONAL HYGIENE TOXICOLOGICAL MEASUREMENTS. ***(Der Einsatz des Halbleiter-Gasdetektors TGS (Taguchi-Gas-Sensor fuer arbeitshygienisch-toxikologische Messungen). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 21(1): 11-12, 1975. 1 ref.***

The use of the TGS semiconductor type gas sensor was tested for its suitability for toxicological and industrial hygienic measurements of trace gases. The test gases used were carbon monoxide and formaldehyde. The concentrations of reducing gases are measured by this gas detector on the basis of the change of the resistance of the semiconductor elements due to the adsorption and desorption of the gases. The measurement requires a constant operating voltage of 12 volts and a constant heating current of 420 mA as optimal values. No reproducible measurement data were obtained with heating currents below 370 mA. A formaldehyde concentration equalling 50% of the MAC value could be determined at an error of + or - 5%. The time elapsing until full reading is obtained amounts to about 9 min. The results indicate that the gas detector is suitable for measurements of reducing gas concentrations relevant for occupational hygiene.

54339 **APTIC NO. 78644**

Solomon, Richard A. and George J. Kallos

DETERMINATION OF CHLOROMETHYL METHYL ETHER AND BIS-CHLOROMETHYL ETHER IN AIR AT THE PART PER BILLION LEVEL BY GAS-LIQUID CHROMATOGRAPHY. ***Anal. Chem., 47(6):955-957, May 1975. 11 refs.***

The use of gas-liquid chromatography to determine chloromethyl methyl ether (CMME) and bis-chloromethyl ether (bis-CME) in air at the ppb level is discussed. Derivatives are formed with the sodium salt of 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, and 2,4-dichlorophenol. The procedure stablizes CMME and bis-CME while significantly increasing the detector sensitivity. This enables the detection of these compounds at the ppb level. High sensitivity is required since 1 v ppb corresponds to 3.3/ng/l and 4.7 ng/l of air for CMME and bis-CME, respectively, as calculated from the Ideal Gas Law.

54340 **APTIC NO. 78767**

Stevens, Robert K. and Thomas G. Dzubay

RECENT DEVELOPMENTS IN AIR PARTICULATE MONITORING. ***IEEE Trans. Nucl. Sci., 22(2):849-855, April 1975. 14 refs.***

The sampling and measuring of air particulates are discussed. A key element in the classification of particulate pollution is the sampling procedures used to collect particles, with the emphasis on separating the respirable from the non-respirable fraction. Impaction techniques are utilized for size collection of particulates, but these procedures are affected by the nature of the impaction collection technique which can cause the particles to bounce from one stage to the next, particularly when larger sample quantities are desired for chemical analysis and gravimetrics. A dichotomous collection device was developed based on virtual impaction principles, which separates and collects particles into two size ranges, 0 to 3.5 micron and 3.5 to 20 micron. Particle bounce at the collection surface is not a problem with this sampler because particles are captured by filtration. The operation and design of manual and automated virtual impactors are discussed. The application of X-ray fluorescence to the analysis of particulates collected with the dichotomous sampler is described. (Author abstract modified)

54341 **APTIC NO. 78972**

Yamazaki, H. and S. Kato

STUDIES ON THE TRACE HYDROCARBONS IN AUTOMOTIVE EXHAUST GAS: MEASURING METHOD FOR POLYNUCLEAR AROMATIC HYDROCARBONS. ***(Jidosha haigasu chu no biryo tankasuiso no kenkyu: Takan hokozoku no sokuteiho). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 601-607, 1975. 13 refs. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)***

Qualitative and quantitative measurement methods for microamounts of polynuclear aromatic hydrocarbons (PNA) in automotive exhaust gas by high speed liquid chromatography (HLC), including sampling methods were evaluated. The separation of PNA (using methanol-water solvent) and reproducibility were tested using PNA of known composition. Descriptions of an HLC system, sampling device, and operating conditions are given with analytical data. The sample gas concentration has to be selected to suit the sensitivity of the analyzer. The HLC is suitable for quantitative determination with good reproducibility; however, the complete qualitative analysis of all components in one measurement is difficult. Therefore, the use of gas chromatography - mass spectrometry along with HLC is desirable. The clean-up process is unnecessary because of the use of methanol as the mobile phase, resulting in good reproducibility. The use of a fluorometer is advantageous for the identification of PNA. The detectable concentration of benz(a)pyrene was 1 ng/l ml sample. It was concluded that HLC is an effective method for the determination of PNA in automotive exhaust gas.

54342 **APTIC NO. 78937**

Young, J. J. and J. N. Zemel

PHOTOLYTIC DETECTION OF H2S WITH A PBSE SENSOR. ***Appl. Phys. Letters, 27(8):455-456, Oct. 15, 1975. 4 refs.***

The sensitivity of lead selenium epitaxial films to atomic hydrogen was used to detect the photodissociation of hydrogen sulfide by ultraviolet radiation. A set of experiments was conducted in a 2-chamber vacuum system with a 1500 A thick PbSe epitaxial film where the resistivity change due to hydrogen effect is a linear function of the Hall coefficient. The voltage across the film is recorded as a function of time. Hydrogen sulfide affects the electrical properties of the PbSe films in a manner similar to that of atomic H. The detailed mechanism of the H2S effect is not known but it suggests that H2S dissociates at the PbSe surface to form atomic H. (Author abstract modified)

1974

54343 **APTIC NO. 78414**

Anechina, P., S. Alvarez, M. L. Merchan, and J. De La Serna

TWO STANDARDIZED METHODS FOR THE DETERMINATION OF SULFUR DIOXIDE IN THE AT-

MOSPHERE, AND STATISTICAL STUDY ON ANALYTICAL METHODS. *(Dos metodos normalizados para la determinacion de anhidrido sulfuroso en la atmosfera y estudio estadistico de sus tecnicas analiticas). Text in Spanish. Rev. San. Hig. Pub., 48(2):115-132, 1974. 5 refs.*

The reliability of the thorin method for the measurement of atmospheric sulfur dioxide was evaluated. The calibration curve is obtained using a series of standard samples in duplicate, from 0 to 8 micrograms of SO2/ml. These standards samples are obtained by adding aliquots of O.1 N solution of sulfuric acid to the absorption solution. The line of best fit is determined using the regression analysis by the method of minimal squares. Three control samples were measured daily from calculated volumes of 0.1 N solution H2SO4, equivalents to 2, 5, and 8 micrograms of SO2/ml.

54344 **APTIC NO. 78600**

Beninson, D., F. Bruner, K. Edvarson, J. H. Harley, M. F. E. Hinzpeter, E. E. Hughes, Dick A. Mack, J. K. Miettenen, D. H. Peirson, Arne Semb, and D. K. Smith

FEASIBILITY OF STANDARDIZATION IN GLOBAL MONITORING OF POLLUTANT DISTRIBUTIONS. *Energy Research and Development Administration, Washington, D. C., Working Group, 22p., July 1974.*

Discussion on standardization methods of sampling and analysis of globally distributed pollution are reviewed. It was agreed that the standardization of instrumentation and procedures would not necessarily lead to comparability of data. Particular attention to calibration and standardization by each laboratory concerned and sound intercomparisons of sampling and analysis among the different monitoring groups was considered the best means of obtaining comparability. The substances discussed were those that might have global implications, including particulates, sulfates, carbon monoxide, carbon dioxide, ammonia and ammonium ion, trace metals, ozone, hydrocarbons, nitrates, carbon-14, tritium, krypton-85, plutonium, halogenated organic compounds, and freon-11. Methods of measuring each are discussed.

54345 **APTIC NO. 78543**

Davis, D. D., P. Hogan, and A. Moriarty

A TUNABLE UV LASER PROBE FOR MAKING ATMOSPHERIC MDASUREMENTS OF THE FREE RADICAL OH. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 124-128. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

A new tunable ultraviolet laser probe is reported on which has been designed to detect the free hydroxyl radical under atmospheric conditions at concentrations as low as 3 times 10 to the 5th power per cu cm. Recent results are also discussed from a smaller, prototype laboratory system, which has been used to determine the sensitivity of the laser-induced fluorescence technique under simulated atmospheric conditions. This same system has been employed to examine several important spectroscopic features of the OH radical. (Author abstract modified)

54346 **APTIC NO. 78928**

Fasching, James L., Reinier A. Courant, Robert A. Duce, and Stephen R. Piotrowicz

A NEW SURFACE MICROLAYER SAMPLER UTILIZING THE BUBBLE MICROTOME. *J. Rech. Atmospheriques, 8(3-4):649-652, July-Dec. 1974. 4 refs. (Presented at the International Symposium on the Chemistry of Sea-air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

A system is described which creates a miniature environment, in situ, for the production and collection of atmospheric sea salt particles. The particles are produced by the bursting of bubbles generated artificially at various depths in ambient sea water. These particles, which are composed of material from the top micron or less of the water surface are injected into a plexiglass truncated pyramid over the water surface from which the outside atmosphere has been excluded. The particles are then collected on a filter for subsequent chemical analysis. The device is mounted on a catamaran which allows operation at sea. (Author abstract)

54347 **APTIC NO. 78564**

Filippov, V. L., V. N. Kazakov, S. O. Mirumyants, V. A. Galyashkin, and L. D. Tsigler

AN OPTO-ELECTRONIC ANALYZER OF THE DISPERSED COMPOSITION OF AEROSOLS. *Sov. J. Opt. Technol., 41(1):30-33, Jan. 1974. 23 refs.*

An optical-electronic aerosol analyzer that is capable of measuring particle sizes ranging from 0.2-60 micron is described. The device operates by detecting the light scattered by individual particles. The instrument electronics are designed to perform an amplitude analysis of pulses appearing across the load of a photodetector. The sampling rate of the instrument is 100 cu cm/min for concentration measurements of up to 4.4 million particles/l. A total of 16 automatic counting channels are provided with four sensitivity ranges.

54348 **APTIC NO. 78912**

Graham, S. C.

THE REFRACTIVE INDICES OF ISOLATED AND OF AGGREGATED SOOT PARTICLES. *Combustion Sci. Technol., 9(3-4):159-163, 1974. 6 refs.*

The optical properties of aerosols of finely divided carbon particles depend on the refractive index of a carbon particle, rather than on that of a macroscopic sample of soot which has a substantial volume fraction of voids. Provided the voids are sufficiently small and are evenly distributed, a simple relationship exists between the volume polarizabilities of a carbon particle and of soot. The difficulties in determining the refractive index of carbon from the ellipsometrically determined values for soot samples are discussed. A new method is proposed which avoids these difficulties. It involves dispersing the soot particles in a liquid which at some discrete wavelength has the same complex refractive index as that of the carbon phase. The closest match corresponds to the lowest minimum in the ratio of diffuse to specular reflectance. The incident light has to be highly monochromatic, such as a tunable dye laser. (Author abstract modified)

54349 **APTIC NO. 78457**

Hayano, S. and N. Shinozuka

MICROANALYSIS OF HEAVY METALS BY DIFFERENTIAL PULSE POLAROGRAPHY. *(Bibun parusu poorarugurafy ni yoru biryo jukinzoku no bunseki). Text in Japanese. Seisan Kenkyu (Prod. Res.), 26(2(:78-81 and 62, Feb. 1974. 8 refs.*

In response to recent reports of injuries heavy metal pollutants in the smoke from garbage-treating factories, microanalysis of those metals was studied by means of differential pulse polarography. Most of these metal pollutants come from plastic wastes the catalysts of which contains heavy metals such as lead, cadmium, or barium. Of the pulse polarography, derivative pulse polarography and differential pulse polarography methods, the latter was the most sensitive. The lowest limit of analysis in the differential pulse method is about 6 times 10 to the minus 7 power M(67.2 ppb) for cadmium and about 2 times 10 to the minus 6 power M(0.414 ppm) for lead. The minimum limit of sensitivity of zinc is 2 times 10 the minus 7 power M(13 ppb) for differential pulse polarography and 0.1 ppm (100 ppb) for the atomic absorption method.

54350 **APTIC NO. 78495**

Latham, J.

ATMOSPHERIC AEROSOL RESEARCH (FINAL TECHNICAL REPORT). *Univ. of Manchester (England),* *Physics Dept., Army Contract DA-ERO-124-74-G0032, Program Element 2M061102B53B, 19p., Nov. 1974. 5 refs.*

NTIS, DDC: ADA007278

The use of an automated photoelectric nucleus counter for measuring aerosol concentrations and size distributions at a rural location in Westmorland, England is described along with some preliminary results. Outside air from about 3 m above ground level was drawn through an inverted collector into a mixing vessel by means of a blower. Equal samples of air were taken every 2 min by two automated condensation nucleus counters operating simultaneously. The frequency distribution for samples taken at different times of the year approximated a log-normal distribution. This distribution was representative of the particle concentration distribution for the study area.

54351 APTIC NO. 78604

Levins, P. L., D. A. Kendall, A. B. Caragay, G. Leonardos, and J. E. Oberholtzer

CHEMICAL ANALYSIS OF DIESEL EXHAUST ODOR SPECIES. *Preprint, Society of Automotive Engineers, New York, 11p., 1974. 11 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress, Detroit, Mich., Feb. 25-March 1, 1974.)*

An isolation scheme for the odor compounds in diesel exhaust was developed. The oily-kerosene odor group is associated with the aromatic portion of the unburned fuel, principally, the alkyl substituted benzenes, indans, and tetralins. The smoky-burnt odors arise from partial combustion products of the paraffin and aromatic fuel components. An instrumental measurement method was developed, based on liquid chromatography, for the quantitative expression of exhaust odor intensity by measurement of the smoky-burnt odor group. Initial survey studies show the method to be applicable over a wide odor emission range. (Author abstract modified)

54352 APTIC NO. 78952

Mamuro, Tetseu, Tadao Matsunami, Yatsuka Matsuda, and Akira Mizohata

COMPARATIVE TESTS OF AEROSOL SAMPLERS. *Annu. Rep. Radiat. Cent. Osaka Prefect., vol. 15:10-17, 1974. 1 ref.*

Airborne dust samples collected at the same place simultaneously by a 10 micron cut sampler and an ordinary sampler were subject to multielement analysis using instrumental neutron activation analysis and energy dispersive X-ray fluorescence analysis. The dust samples collected by open samplers show a satisfactorily good uniformity. In the dust samples collected by 10 micron cut samplers, the dust surface density is unexpectedly lower in the center part, indicating quite an unsatisfactory uniformity. Such non-uniformity is possibly caused by the spiral motion around the center cylinder. When the outlet tubes of the cyclones are not in right position, the air motion becomes much more complicated, causing nonuniformities other than in a radial direction. (Author abstract modified)

54353 APTIC NO. 78875

Masami, F.

SCIENCE IN MERCURY ANALYSIS FOR ENVIRONMENTAL SAMPLES. *(Kankyo shiryo no suigin bunseki ni kansuru kagaku). Text in Japanese. Kagaku To Yakugaku No Kyoshitsu (Chem. Pharm. Quart J.), no. 44:15-26, Sept. 1974. 28 refs.*

Air containing more than 0.01 micrograms/cu m of mercury was sampled at 2 l/min for 12 hr using a push-in type pump. The air was first passed through a dust removing bottle and a series of three furnaces. The interfering substances were removed by oxidation. After passing through a washing bottle, mercury was collected in a metal wool trap. The mercury was released by heating the metal wool trap and was analyzed by atomic absorption. The removal of sulfur and hydrogen sulfide by oxidation and complete combustion of hydrocarbons in automobile exhaust gas were important in order to prevent interference. The metal wool used for the adsorption of mercury included gold foil and silver screen.

54354 APTIC NO. 78556

Rosen, James M., Ronald G. Pinnick, and Rice Hall

RECENT MEASUREMENTS OF CONDENSATION NUCLEI IN THE STRATOSPHERE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 298-302, 6 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

A type of condensation nuclei counter for application a low pressures has been developed. This instrument draws ambient air through a chamber in which a given degree of supersaturation is maintained. The condensation nuclei in the sampled air subsequently grow fairly large and are then counted by a photoelectric particle counter. This technique has the advantage of not requiring the usual type of calibration. The condensation nuclei counter was tested in a vacuum chamber under simulated stratospheric pressures to adjust the parameters so that the efficiency would be independent of pressure. A test balloon flight was conducted on December 19, 1973, from Laramie, Wyoming; consistent data were obtained on both ascent and descent. The condensation nuclei profile and concentrations agree fairly well with earlier direct measurements of condensation nuclei. Typical condensation nuclei concentrations in the stratosphere inferred from this first flight are about 10 per cu m or less. (Author abstract)

54355 APTIC NO. 78517

Thibodeaux, Louis J.

A TEST METHOD FOR VOLATILE COMPONENT STRIPPING OF WASTE WATER. *Arkansas Univ., Fayetteville, Coll. of Engineering, Environmental Protection Agency Grant R-801876, Rept. EPA-660/2-74-004, 130p., May 1974. 21 refs.*

A laboratory apparatus and experimental procedure measure dissolved volatile organics in wastewater, and the relative ease with which they can be removed by desorbing into air. A short packed (Intalox Saddle) section with liquid recirculation and single pass countercurrent air flow is used to perform desorption studies on nineteen wastewater samples: actual wastewater from poultry, metal, oil-field, canning, pharmaceutical, paper, food, fibers, petroleum refinery and petrochemical industries, single pure components in water, and simulated wastewater samples. Industrial wastewaters are found to contain a non-volatile organic fraction that remains in the water and a volatile organic fraction that can be transferred to the air. The conclusion is that some industrial wastewaters can be effectively treated by air stripping a sizeable portion of the dissolved organics. Desorption was performed at 25 deg. C and ambient pressure conditions. Biological oxygen demand (BOD), chemical oxygen demand (COD), total organic carbon (TOC) and gas chromatographic analysis were employed with the experiments. Results of one hour desorption runs indicate that the range of the volatile organic fraction is 0 to 70 percent TOC. The ultimate volatile range was calculated to be 0 to 98 percent TOC. The volatile organic fractions displayed a range of relative volatilization rates 4.4 to 41.6 times greater than water. The laboratory device can simulate the air-stripping operation of cooling towers and similar units. Accounting for the volatile fraction can also increase the accuracy of industrial wastewater audits, and allow estimation of the importance of species desorption from water as a source of air pollution, including odor pollution. The report includes a computer program to calculate the fraction maximum degree of treatment and relative rate of removal for air volatile organics. (Author introduction modified)

54356 **APTIC NO. 78687**

Tuttle, J. H., R. A. Shisler, and A. M. Mellor

NITROGEN DIOXIDE FORMATION IN GAS TURBINE ENGINES: MEASUREMENTS AND MEASUREMENT METHODS. *Combustion Sci. Technol., 9(5 and 6):261-271, 1974. 43 refs.*

Methods of nitrogen dioxide detection are discussed with particular emphasis upon the converter-chemiluminescent and non-dispersive ultraviolet (NDUV) instruments. Although the analysis of a blended nitrogen oxides-air mixture by both instruments generally result in excellent agreement between the measured NO2 levels, agreement is much poorer when combustion gases are analyzed. The composition of the sample blended for use in determining the efficiency of the converter chemiluminescent detector should be more representative of the actual exhaust gases to be analyzed. In particular, carbon monoxide, hydrocarbons, and fine soot particles should be included in the mixture. If any carbon particles remain in the sample gas, the indicated NO2 levels via the NDUV analyzer will be exceedingly high, while the levels measured by the converter chemiluminescent detector are likely to be low. Significant NO2 losses are likely during sample transfer, with the extent of the losses being strongly dependent upon the history and cleanliness of the sampling train.

1973

54357 **APTIC NO. 78911**

Brocco, D. and P. Greco

DETERMINATION OF THE SUSPENDED PARTICULATE MATTER IN THE AIR. *(Determinazione del materiale particellare nell atmosfera). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1): 466-476, 1973. 3 refs.*

The gravimetric and smoke shade methods used to measure suspended particulate matter are compared. The reproducibility of the gravimetric method is determined as a function of the type and porosity of the filter used to collect the particulate matter. Collections lasted 12 to 24 hours and were made approximately 10 m from the road surface in an area where car traffic and domestic heating were the only sources of pollution. The size of the membrane pores and the sampling flow rates were important factors in collection efficiency. Results obtained with different procedures have low grade comparability. In order to objectively evaluate air quality criteria in accord with current legislated standards, it is necessary to standardize and correlate collection techniques and analytical procedures.

54358 **APTIC NO. 78830**

Cecchetti, G. and B. Sperduto

QUANTITATIVE DIFFRACTOMETRIC QUARTZ ANALYSIS IN DUSTS COLLECTED ON FILTERING MEMBRANES. *(Analisi diffrattometrica quantitativa del quarzo in polveri raccolte su membrane filtranti). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):389-398, 1973. 10 refs.*

A method for the analysis of the diffractometric quartz content in atmospheric dust collected on cellulosic membranes is described. The technique is based on the possibility of a background reduction and of an optimal focalization of the incident beam. The filter with the sample is covered with an ultrathin cellulosic membrane and compressed on a lead base. The detection limit is 10 micrograms of quartz. The calibration curves of quartz, in the presence of interfering matrices such as calcite, montmorillonite, bentonite, and kaolinite, are independent from the matrix for amounts of sampler lower than or equal to 0.5 micrograms.

54359 **APTIC NO. 78947**

Fantuzzi, A., G. Consonni, and G. Locati

DEFINITION OF A METHOD FOR THE DETERMINATION OF ISOCYANATES IN THE ATMOSPHERE. *(Messa a punto di una metodica per la determinazione degli isocianati nell atmosfera). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):528-533, 1973. 2 refs.*

A method for the determination of isocyanates (toluenediisocyanate and diphenylmethanediisocyanate) in the atmosphere is described. The method shows exceedingly low sensitivity limits and is applicable in work environments. It is derived from Marcali's conventional method and can be used in laboratories with simple base instruments.

54360 **APTIC NO. 78587**

Fontanges, R. and P. Isoard

A NEW APPARATUS WITH LARGE AIR INTAKE FOR THE SAMPLING OF ATMOSPHERIC MICROCONSTITUANTS. *Aerobiol. Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 62-66.*

An apparatus capable of sampling airborne microorganisms and particulates with diameters less than 5 micron in large volumes of air at a high rate of aspiration is described. The device is based on the use of a micro-fog of sterile demineralized water to wash the air sample. The air to be examined is aspirated by means of a motor driven extractor fan and is first passed through a steel gauze of suitable dimension to remove undesirable objects such as insects and leaves. The air is then conducted through a cyclone type separator which separates out particles with diameters greater than 10 micron. The finer particles are transported by the air stream to the micro-fog section. A venturi aspirating tube is used to achieve instantaneous condensation on the microparticles which become droplet nuclei. The convergence is followed by a divergence which produces deceleration of the micro-fog and coalescence of the nuclei which are then separated from the former and collected by a cyclone. Particles having a diameter greater than 1 micron are thus retained, while those of lesser diameter are eliminated through a terminal ventilator and conducted back through a sound-proof shaft.

54361 **APTIC NO. 78505**

Gustafson, S.-A. and K. O. Kortanek

DETERMINING SAMPLING EQUIPMENT LOCATIONS BY OPTIMAL EXPERIMENTAL DESIGN WITH APPLICATIONS TO ENVIRONMENTAL PROTECTION AND ACOUSTICS. *Royal Inst. of Tech., Stockholm, Sweden and Carnegie-Mellon Univ., Pittsburgh, Pa., Comput. Sci. Stat., 7th Annu. Symp. Interface Proc., Ames, Iowa, 1973, p. 332-338, 25 refs. (Oct. 18-19.)*

The problem of estimating vector fields governed by linear differential or functional equations from data collected at a finite number of locations is discussed in relation to determining sampling equipment locations for air pollution monitoring. The direct application of an optimal regression experimental design makes the uncertainty in the estimates as small as possible and specifies where the measurements are to be taken. Error bounds are developed for the variances of estimates of maximum intensity of a given function and the location giving this maximum. The method is illustrated for the St. Louis air control region.

54362 **APTIC NO. 78599**

Hislop, J. S.

SOME APPLICATIONS AT HARWELL OF NON-DESTRUCTIVE GAMMA PHOTON ACTIVATION ANALYSIS. *Preprint, Bundesanstalt fuer Materialpruefung, Berlin (Germany), 17p., 1973. 6 refs. (Presented at the Activation Analysis Seminar, 4th, Berlin, Germany, Oct. 11, 1973.)*

Gamma activation offers a complementary technique to thermal neutron activation by making available an entirely different range of nuclear reactions for analytical purposes. Certain applications of gamma photon activation are described which illustrate how the technique can be used without the use of radiochemical separations. These include the determination of certain light elements using decay curve analysis of beta + activity, and the advantages and disadvantages of the method are discussed. Used in conjunction with high resolution gamma ray spectrometry, gamma activation has been applied to the analysis of a variety of materials of geological and environmental interest, emphasis being placed on elements not readily determined using thermal neutrons. An attempt has been made to place gamma activation in perspective with regard to alternative analytical methods for such analyses. (Author abstract)

54363 **APTIC NO. 78789**

Mammarella, L.

SPECIAL MICROSCOPICAL TECHNIQUES FOR THE CHARACTERIZATION OF AEROSOLS. *(Particolari tecniche microscopiche per la caratterizzazione di aerosoli). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):431-441, 1973. 25 refs.*

A special microscopic technique for the characterization of aerosols was developed and applied to engine exhausts, ground dust, and tobacco smoke. The aerosols are examined by a differential sampler and observed under a polarized light. Aerosols from motor vehicle exhausts are characterized by metal particles such as lead or Pb compound of an isodiametric shape. Dust raised from the ground consists of minerals of different types and shapes. Tobacco smoke is characterized by carbon and tarry residues and of inhalable sizes and coarser inert particles.

54364 **APTIC NO. 78585**

May, K. R.

DEVELOPMENTS IN HIGH VOLUME SAMPLING OF AEROSOLS. *Aerobiol. Airborne Transm. Airborne Infect. Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 27-32. 10 refs.*

The design and operation of two impaction devices for the high volume sampling of microorganisms and aerosols are described. Each sampler utilizes a monolayer of oxyethylene docosyl ether on an agar plate to retard evaporation induced by the rush of air over the agar surface. A device known as the Pagoda sampler which consists of three impaction stages is useful for sampling low concentrations of airborne particulate matter. The top stage has an effective cut-off diameter at 18 micron, while the other two stages collect particles between 18 and 5 micron and 5 and 1 micron. Another device based on the modified Andersen sampler uses eight stages to collect particles of 20, 10, 7.5, 5, 3, 2, 1, and 0.5 micron in diameter. This sampler is useful for either high sampling concentrations or for very long sampling periods at low concentrations.

54365 **APTIC NO. 78660**

Monteriolo, S. C. and M. A. Bertolaccini

MEASUREMENT OF NITROGEN DIOXIDE IN THE AIR. *(Rilevamento degli ossidi di azoto nell aria). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):489-498, 1973. 10 refs.*

A comparative study of automatic analytical methods for the monitoring of nitric oxide and nitrogen dioxide in the air indicates the need for a correct chemical conversion of the nonmeasurable species into the measurable species to obtain dependable results. The automatic colorimetric and chemiluminescent methods were compared to the manual colorimeter, and the electrochemical method was compared to chemiluminescence. Average, minimum, and maximum values are given for each comparison. All three methods are equally valid, in response linearity, sensitivity, and concentration limit, for the determination of nitric oxide, the measurable species. The determination of nitrogen dioxide, however, is strictly dependent on the efficiency of the conversion of the non-measurable species into the measurable form.

54366 **APTIC NO. 78791**

Patroni, M. and N. Zurlo

GRAVIMETRIC DETERMINATION OF INHALABLE DUSTS. *(Determinazione gravimetrica delle polveri inalabili). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):445-451, 1973.*

A comparison between the values obtained in drawings for the gravimetric sampling of total dusts and the inhalable fraction and the conimetric drawings was made at 64 departments of 27 industrial plants. The conimetry and the inhalable fraction of gravimetry yield give coincident average results for a dustiness in the maximum allowable concentration order.

AIR QUALITY MEASUREMENTS

1975

54367 **APTIC NO. 78757**

Jacobson, Jay S. and Gregory D. Salottiolo

PHOTOCHEMICAL OXIDANTS IN THE NEW YORK-NEW JERSEY METROPOLITAN AREA. *Atmos. Environ., 9(3):321-332, March 1975. 44 refs. (Presented at the American Chemical Society, Northeast Regional Meeting, 5th, Rochester, N. Y., Oct. 1973.)*

Atmospheric oxidant concentrations measured at seven locations during the years 1970-1972 in the New York-New Jersey metropolitan areas were compared. Oxidants occur in highest concentrations during the months of May-Sept. A diurnal pattern exists during the spring and summer seasons with concentrations usually rising to a maximum between 12:00 and 17:00 EST. The Federal ambient air quality standard of 0.08 ppm is exceeded each year with a frequency varying with location. Maximum hourly average concentrations for the region are in the range of 0.2-0.3 ppm. Sites located in heavily trafficked areas generally report lower oxidant concentrations than sites in suburban areas. Elevated concentrations occur more frequently with wind directions from the southeast through southwest sectors, wind speeds between 6 and 11 mi/hr, solar radiation intensities above 400 Langleys, temperatures greater than 75 F, and with early morning mixing depths less than 100 m. Concentrations of oxidants in Yonkers rarely exceed 0.05 ppm during the winter or on days with low solar radiation. (Author abstract modified)

54368 **APTIC NO. 78617**

Neustadter, H. E., R. B. King, and J. S. Fordyce

ELEMENTAL COMPOSITION OF SUSPENDED PARTICULATES AS FUNCTIONS OF SPACE AND TIME IN CLEVELAND, OHIO. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 17 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-28.1.)*

Neutron activation and emission spectrometric analyses of over 750 24-hour airborne particulate samples collected at 16 sites in Cleveland, Ohio from August 1971 to October 1972 were performed. The data were analyzed with the aid of pairwise correlation statistics, selective data plotting, and cluster analysis. Bromine and lead, taken as a pair, showed relatively low variability and were similarly enriched when normalized to silicon as compared with typical earth crustal abundances. Lanthanum, samarium, europium, dysprosium, and thorium generally exhibited the same spatial distribution as aluminum, silicon, titanium, selenium, and vanadium. As a group they were not highly variable and did not show any enrichment relative to earth crustal abundance. Iron, chromium, and cobalt jointly exhibited a slightly more variable distribution pattern and showed possible enrichment. Copper, magnesium, and antimony were significantly enriched, and each possessed its own distinctive distribution pattern. Possible industrial emission sources of particulates in the area were related to the various enrichment patterns observed. (Author abstract modified)

54369 **APTIC NO. 78653**

O Brien, Joseph and Eugene F. Barry

ATMOSPHERIC LEAD CONTENT OF EASTERN MASSACHUSETTS. *Environ. Letters, 8(4):297-302, 1975. 5 refs.*

Atmospheric lead concentrations were measured at several sites in Eastern Massachusetts during 1972. Lead concentrations were directly proportional to the degree of urbanization, with the highest concentrations occurring in the largest population centers. Ambient lead levels in Boston ranged from 3.80 (spring) to 5.38 micrograms/cu m (winter), while those for the less urbanized cities of Lawrence and Framingham ranged from 1.04-2.32 micrograms/cu m and 0.796-1.66 micrograms/cu m, respectively. Elevated lead levels at Lawrence and Framingham during the fall of 1972 were attributed to air stagnation or inversion conditions during this period.

54370 **APTIC NO. 78618**

Record, Frank A., Robert M. Bradway, Charles E. Findley, and David C. Bray

FIELD STUDIES OF SUSPENDED PARTICULATES IN TWO IDAHO CITIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-28.2.)*

Suspended particulate concentrations at rural and urban locations in the state of Idaho were measured to assist in the development of a control strategy for achieving the national particulate matter secondary ambient air quality standards. Particulate concentration distributions were measured nearly continuously from October 2, 1972 to December 15, 1972 in Moscow and from June 1, 1973 to August 31, 1973 in Twin Falls. Concurrent daily samples were also collected in five areas during the summer and fall of 1972 to establish typical urban/rural concentrations. Typical geometric means for rural areas outside the five test cities ranged from 35-45 micrograms/cu m. The secondary 24-hour standard was frequently exceeded in the center city districts of the study areas, apparently as a result of fugitive dust sources. The primary 24-hour standard was exceeded only in the vicinity of obvious strong sources such as construction and street repair activities. Daytime concentrations consistently exceeded nighttime values only in urban areas near such sources. Geometric means in the five test urban areas during dry weather ranged from 90-120 micrograms/cu m. A special watering program in Twin Falls consisting of sprinkling two unpaved parking lots early in the morning did not appreciably reduce concentrations at a nearby monitor. (Author abstract modified)

54371 **APTIC NO. 78954**

Hokkaido Prefectural Government Office, Dept. of Life Environment

PRESENT SITUATION OF AIR POLLUTION IN HOKKAIDO. *(Hokkaido no Taiki osen jokyo). Text in Japanese. 548p., Jan. 1975.*

Results of air pollution measurements in 1973 at more than 20 locations in Hokkaido are tabulated. Sulfur dioxide and sulfur oxides were analyzed by conductivity and lead dioxide methods, respectively; airborne aparticulates by a light scattering method; nitrogen oxides and oxidants by a spectrophotometric method, hydrogen fluoride by specific ion electrode, and dust was by deposit gauge. The average SO2 concentrations ranged from 0.008 ppm at Utonai to 0.025 ppm at Shinnittetsu Gymnasium at Muroran. The average airborne particulates concentrations ranged from 0.02 mg/cu m at 9 locations (out of 14) to 0.08 mg/cu m at Tokura store at Obihiro. The average NOx concentrations ranged from 0.017 ppm at Akino, a semi-industrial area, to 0.11 ppm at Living Yasumoto, a commercial area. The average oxidants and HF concentrations at Akino were 0.028 ppm and 0.1 ppb, respectively. The highest average dust concentration was 52.3 t/sq km/mo at Shinittetsu Gymnasium. The highest average SOx concentration was 0.85 SO3 mg/day/100 sq cm at Yusaicho in Muroran city.

1974

54372 **APTIC NO. 78576**

Ellsaesser, Hugh W.

HAS MAN, THROUGH INCREASING EMISSIONS OF PARTICULATES, CHANGED THE CLIMATE? *Preprint, California Univ., Livermore, Lawrence Livermore Lab., 22p., Aug. 1, 1974. 25 refs. (Presented at the Atmospheric-Surface Exchange of Particulates and Gaseous Pollutants Symposium Proceedings, Richland, Washington, Sept. 4-6, 1974.)*

NTIS: UCRL-75902

Data relating to natural and anthropogenic particulate emissions and trends in atmospheric turbidity are reviewed. Man contributes an estimated 13.6% of the 3.5 billion tons of primary and secondary particulates presently emitted to the atmosphere annually. Values derived for the anthropogenic effect on the trend in total airborne particulates (if assumed monotonic) reveal an annual increase of from 0.06-0.4%. This effect is only marginally detectable in terms of the available record, and the much larger rates of increase published as proof of an upward trend appear to be due to local or temporary effects rather than being representative of a global trend. On the other hand, almost all urban areas plagued by dirty skies prior to the 1940 s show measurable improvement in recent years in terms of visibility, dust fall, suspended particulates, or the ratio of sunshine in the central city to that at an outlying station. Thus, past upward trends in airborne particulates appear to have been halted or even reversed over the past few decades. (Author abstract modified)

54373 **APTIC NO. 78927**

Hoffman, Eva J., Gerald L. Hoffman, and Robert A. Duce

CHEMICAL FRACTIONATION OF ALKALI AND ALKALINE EARTH METALS IN ATMOSPHERIC PARTICULATE MATTER OVER THE NORTH ATLANTIC. *J. Rech. Atmospheriques, 8(3-4):675-688, July-Dec. 1974. 30 refs. (Presented at the International Symposium on the Chemistry of Sea-air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Samples of bulk atmospheric particulate matter were collected on seven cruises covering wide areas of the North Atlantic Ocean. The samples were collected on a specially constructed 8 m tower on the bow of a research vessel. Collection equipment was controlled automatically by relative wind direction to prevent the collection of particles originating from the ship itself. Samples were analyzed for sodium, calcium, potassium, magnesium, strontium, and iron by atomic absorption. The amount of dust from land in the samples was measured by analysis of iron and other crustal components in the samples. The entire sample population and groups of samples classified by their dust content were statistically examined. Alkali and alkaline earth metal enrichment, relative to metal to Na ratios in seawater, generally increased with increasing iron and dust content. The enrichments compared to seawater of Mg, Ca, K, and Sr on atmospheric sea salt particles with very low dust content are all less than 5% over the North Atlantic Ocean. There is apparently little major cation fractionation in the bulk sea salt aerosol relative to seawater as an oceanwide phenomenon in the northern hemisphere. (Author abstract modified)

54374 ***APTIC NO. 78460***

Nakamura, K. and T. Takemi

MEASUREMENT OF AIR POLLUTANT DENSITY IN HIGASHIOSAKA. (Kan-i Sokutei-ho ni yoru Higashiosaka-shi taiki osen no sokutei). Text in Japanese. Kinki Daigaku Genshiryoku Kenkyusho Nenpo (Kinki Univ. At. Energy Res. Inst. Annu. Rep.), vol. 11:19-25, 1974.

The density of nitrogen dioxide and sulfur dioxide in the atmosphere was observed at 8 stations in Higashiosaka from August through December 1973. Observations were carried out using the filter paper sampling method, by measurement of color intensity by the Saltzmann solution for NO2, and by the p-rosaniline solution for SO2. The density of NO2 during this observation period increased gradually, and an average density was .004 ml/12 sq cm/day in August and September, .0045 ml/12 sq cm/day in October, .0055 ml/12 sq cm /day in November, and .008 ml/sq cm day in December. On the other hand, the density of SO2 was almost constant throughout the observation period, the average being about .001 ml/12 sq cm/day.

54375 **APTIC NO. 78442**

Risto Ajo

THE MEASUREMENT OF AIR POLLUTION. *(Ilmaa saasteanalyysi- mittauksia). Text in Finnish. Kemia-Kemi, no. 6:340-341, 1974. 2 refs.*

In those areas where industrial and urban development is greatest, pollution is usually heaviest. In West Germany the quantities of the following impurities emitted into the air in 1969 were as follows: carbon monoxide, 8/Mton; dusts, 4 Mton; Sulfur dioxide, 4 Mton; nitrogen oxides, 2 Mton; hydrocarbons, 2 Mton. There were 2 Mton of fluorides, hydrogen chloride, and strong-smelling substances combined. Fifty-six percent of this was caused by traffic, 18% by energy production, 17% by industry and 9% by households. Measurement stations are generally situated near large industrial and urban centers. When the information from a large area is collected for further analysis there are several advantages. Planning of new industrial sites and traffic routes is improved, smog warnings can be issued when critical levels are reached and polluting industries can be located. The state of Baden-Wurttenberg in West Germany is installing a network of measuring stations. Siemens, Inc. is supplying the analyzers, information transfer machinery and process computers. The industrial and urban density is light in Finland and a network of this kind is not yet a timely issue.

54376 **APTIC NO. 78577**

Tsugio, Mizoguchi, Ishikawa Yoshinori, Nomoto Hideyuki, and Miyao Akiko

AN ANALYSIS OF AIR POLLUTION IN OSAKA. *(Osaka in okeru taiki osen jokyo no ichi-kosatsu). Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 5(1):220, 1970. Translated from Japanese by Leo Kanner Assoc., Redwood City, Calif., 4p., Oct. 1974.*

NTIS: PB-237 897

The location of measuring points in Osaka was investigated to determine whether they are representative of the area. Sulfur dioxide data are used for the twelve months from April 1969 to March 1970 for which measured values for more than 500 hr/mo were available for all measuring stations. Analysis of wind data, and of correlation coefficients for SO2 concentration between measuring stations (evolved from monthly mean values for points within and outside the city) allows mapping of areas with similar pollution characteristics and suggests the pattern of influence of different emission sources.

54377 **APTIC NO. 78931**

Tokushima Prefectural Government

SUMMARY OF ENVIRONMENTAL POLLUTION CONTROL. *(Kogai taisaku gaiyo). Text in Japanese. 518p., 1974.*

The total number of registered smoke emitting facilities increased from 495 in 1972 to 578 in 1973. The 578 facilities included 412 boilers (73% of the total facilities). The sulfur content of the crude oil used at these facilities ranged from 0.4% to 3.14% and the fuel consumption ranged from 21.3 l/h to 5740 kg/h. The average sulfur dioxide concentrations measured by conductivity method ranged from 0.011 ppm at Ogata in Anan city to 0.023 ppm at Kitajimacho. The sulfur trioxide concentration measured by lead dioxide method ranged from 0.02 SO3 mg/day/100 sq cm at Jinmoku in Kamiyamacho to 0.94 SO3 mg/day/100 sq cm at Kawauchikita of Tokushima city. The highest average dust concentration was 12.1 ton/sq km/mo at Nakashima in Kawauchi-cho. Nitrogen oxides were first measured at Anan monitoring station in 1973. The highest daily average concentrations of nitrogen dioxide, nitric oxide and NOx were 0.024 ppm, 0.010 ppm and 0.026 ppm, respectively. The average carbon monoxide concentrations ranged from 0.8 ppm at Tomiokanishi High School near national highway 55 to 4.0 ppm at Hisaki in Kawauchi-cho near national highway 11. The maximum allowable concentrations of ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine were set at 1.5 ppm, 0.003 ppm, 0.05 ppm, 0.03 ppm and 0.005 ppm, respectively.

1973

54378 **APTIC NO. 78566**

Gillette, D. A., I. H. Blifford, Jr., and D. W. Fryrear

STUDIES OF AIRBORNE SOIL FROM WIND EROSION. *Soil Conservation Society of America, Soil Conserv. Soc. Am. Proc. 28th Annu. Meet. (Plants, Animals and Man), Hot Springs, Ark., 1973, p. 29-33. 15 refs. (Sept. 30-Oct. 3.)*

An isokinetic jet impactor system mounted on an aircraft was used to sample tropospheric dust levels during a large dust storm in the Southern Great Plains. A total of seven samples were obtained between 6000 and 13,000 ft above mean sea level. Dust concentrations did not vary greatly with altitude and sampling location; this was consistent with the vigorous mixing and high windspeeds associated with the dust storm. The highest dust concentration recorded was 27.1 tons/cu mi. Sedimentation velocity increased greatly with particle size, and the maximum size aggregate that was transported for long distances did not vary greatly, being usually the size of coarse silt for fine sand. Size distribution measurements of soil erosion aerosols revealed that clay-sized aerosol particles accounted for much less mass than did silt-sized particles.

ATMOSPHERIC INTERACTION

1975

54379 **APTIC NO. 78623**

Blumenthal, D. L. and W. H. White

THE STABILITY AND LONG RANGE TRANSPORT OF OZONE OR OZONE PRECURSORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. 10 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-07.4.)*

Analyses of observational data for a typical day in the Los Angeles Basin indicate that ozone and/or its precursors can be transported from the metropolitan area approximately 100 km downwind to the eastern portion of the Basin. Most of the ozone burden at the downwind locations in the afternoon is due to precursors emitted earlier in the day or even during the previous night in the western basin upwind. The contributions to the ozone burden in the eastern basin due to emissions in the western basin is sufficient to cause the ambient air standard (0.08 ppm) to be exceeded even in the absence of any local contributions. Ozone is also observed in rural areas downwind of the Los Angeles Basin at concentrations as high as 0.4 ppm. Observations of ozone in layers aloft both at night and in the rain indicate that ozone is stable in the absence of other substances to scavenge it. Urban sources appear to exert a substantial effect on ozone concentrations in downwind areas, with the effect persisting for more than 1 day at times. (Author conclusions modified)

54380 **APTIC NO. 78793**

Brown, R. M., R. N. Dietz, and E. A. Cote

THE USE OF SULFUR HEXAFLUORIDE IN ATMOSPHERIC TRANSPORT AND DIFFUSION STUDIES. *J. Geophys. Res., 80(24):3393-3398, Aug. 20, 1975. 9 refs.*

The use of sulfur hexafluoride as a tracer in atmospheric transport and diffusion studies is discussed. Airborne and ground level concentration measurements using specially designed chromatographs were made. They illustrate the potential use of the method in tracking plumes from short or tall stacks and its ability to isolate and detect concentrations from a particular site. Meteorological input and other pertinent input information are used in a computer programmed model to compare measured versus calculated diffusion parameters. A measure of the standard deviation of the wind direction at plume height produces the best fit to the measured concentrations. The model is being developed to predict diffusion patterns and the concentrations from single and multiple source stacks. (Author conclusions modified)

54381 **APTIC NO. 78427**

Chan, C. H.

EFFECTIVE ABSORPTION FOR THERMAL BLOOMING DUE TO AEROSOLS. *Appl. Phys. Letters, 26(11):628-630, June 1, 1975. 12 refs.*

Thermal blooming on laser propagation due to the presence of aerosol particles is discussed. Emphasis is placed on the derivation of an effective absorption coefficient alpha eff(t), where alpha eff(t) corresponds to that part of aerosol absorption which heats up the air only. Because of the small but nonvanishing heat capacity of the aerosol particles, air is not instantly heated resulting in a small time delay in thermal blooming. (Author abstract modified)

54382 **APTIC NO. 78654**

Cicerone, Ralph J.

MINOR CONSTITUENTS IN THE STRATOSPHERE AND MESOSPHERE. *Rev. Geophys. Space Physics, 13(3):900-903, 921-924, July 1975. 139 refs.*

A reivew of research conducted between 1971 and 1974 on trace constituents in the stratosphere and mesosphere is presented. Topics covered include: the effect of nitrogen oxide emissions from supersonic aircraft on the ozone layer, model calculations of stratospheric ozone levels, measurements of nitric oxide and nitrogen dioxide in the stratosphere, the role of nitric acid in atmospheric reactions involving nitrogen oxides, the effect of chlorofluoromethanes on the stratospheric ozone balance, the need for stratospheric measurements of atomic oxygen concentrations, the modeling of possible perturbations to mesospheric NO induced by aerospace operations, direct and indirect measurements of mesospheric ozone, and the effects of expected additions of water vapor and chlorine oxides on atmospheric levels of ozone.

54383 **APTIC NO. 78742**

Clark, William E. and Kenneth T. Whitby

MEASUREMENTS OF AEROSOLS PRODUCED BY THE PHOTCHEMICAL OXIDATION OF SO2 IN AIR. *J. Colloid Interface Sci., 51(3):497-490, June 1975. 18 refs.*

The formation and growth of aerosols produced by the photooxidation of sulfur dioxide in initially particle free air was measured and characterized over the size range from 0.00040 micron to 0.4 micron using a Whitby Aerosol Analyzer and a Condensation Nuclei Counter. The same basic pattern of aerosol formation and growth is observed over the range of SO2 concentrations from 0.049 to 2.88 ppm. The particle volume concentration increases linearly with time indicating a steady condensation of material from the vapor to the condensed phase. Calculated values of the overall photooxidation rate of SO2 in air adjusted to noon day sunlight range from 0.379 to 0.992%/hr. Estimates of the partial pressure of sulfuric acid vapor at the onset of nucleation range from 1.72 times 10 to the -8th power to 1.2 times 10 to the -7th power mm mercury. (Author abstract modified)

54384 **APTIC NO. 78743**

Davidson, G. A. and W. D. McComb

TURBULENT DIFFUSION IN AN AEROSOL JET. *J. Aerosol Sci., 6(3/4):227-247, 1975. 21 refs.*

The turbulent diffusion of small, spherical particles suspended in a round, free jet is studied theoretically in the jet similarity region. Particles of infinitesimal size are treated by applying Taylor s theory of diffusion by continuous movements to define the fluid diffusivity of a scaled jet. The hypothesis is made that a transformation from Lagrangian to Eulerian variables, which is correct for homogeneous turbulence, may also be used in the similarity region of the jet. On this basis, the density distribution is obtained and agrees quite well with experimental measurements of heat and trace gas diffusion. Particles of finite size are treated by a perturbation method, in which the infinitesimal particle results are invoked as a zero order solution. The results are compared with available measurements of finite particle diffusion jets. Information on the radial spread of fluid and finite particles downstream of the jet orifice is obtained. (Author abstract modified)

54385 **APTIC NO. 78918**

DeLuisi, J. J., B. M. Herman, S. R. Browning, and R. K. Sato

THEORETICALLY DETERMINED MULTIPLE-SCATTERING EFFECTS OF DUST ON UMKEHR OBSERVATIONS. *Quart. J. Royal Meteorol. Soc. (London), 101(428):325-331, April 1975. 18 refs.*

The multiple-scattering effects of dust on Umkehr observations were determined using theoretical calculations of radiative transfer for a vertically inhomogeneous atmosphere. Multiple scattering produces deviations from the haze-effect curve calculated on the basis of primary scattering only. These deviations tend to bring the theoretically calculated curves into better agreement with experimental results, but there is introduced a greater complexity in the haze effect curve itself, especially with changes in the refractive index of the dust. With multiple scattering the haze effect increases with increasing absorption by dust; a result directly opposite to that for primary scattering. If the Umkehr curve is adjusted so that N equals 0 at a solar zenith angle of 60 degrees then according to the multiple scattering calculations, haze decreases the N value between 60 and 85 degrees, but depending on the refractive index of the dust, the N value either can be increased or decreased beyond 85 degrees. Primary scattering calculations produce a decrease in the N value at all solar zenith angles. (Author conclusions modified)

54386 **APTIC NO. 78775**

Forland, Eirek J. and Yngvar T. Gjessing

SNOW CONTAMINATION FROM WASHOUT/RAINOUT AND DRY DEPOSITION. *Atmos. Environ., 9(3):339-352, March 1975. 8 refs.*

The deposition of air pollutants in the Bergen region, Western Norway, is investigated. Dry snow was sampled from the ground at 46 locations just after a snowfall and then three days later. Consistent and logical patterns for the two days are found for sulfate, magnesium, calcium, zinc, pH value, and conductivity. The rate of the dry deposition in the rural areas is significantly smaller than the rate of washout/rainout. In the city area these two rates are of the same magnitude. (Author abstract modified)

54387 **APTIC NO. 78871**

Geiger, B.

THE EFFECTS OF URBAN ENERGY CONVERSION ON THE URBAN CLIMATE. *(Die Auswirkungen des urbanen Energieumsatzes auf das Stadtklima). Text in German. Gesundh. Ingr., 96(6):156-165, 1975. 1 ref.*

The effects of urban energy conversion on urban climate and air pollution levels were studied in Munich. Space heating accounts for 47% of the total amount of primary energy used in Munich, and over 70% of the total energy used yearly is used up during the months October through April, which results in waste heat emissions exceeding the solar energy input during the winter months, and in higher humidity levels in winter than in summer. The carbon monoxide, hydrocarbon, nitrogen oxides, and dust concentrations in Munich showed an increasing tendency during the 1967-1970 period, while the sulfur dioxide concentrations show a downward trend, which is due to the obligatory use of remote heat and natural gas in the center city. The nitrogen oxides originate primarily from motor vehicles, which calls for the increased use of mass transportation. Solid particulates originate primarily from domestic heating and trade in summer, and from traffic in summer. The fact that the winter-to-summer ratio of the SO2 concentrations is smaller than the ratio of the quantities emitted in winter and summer may indicate an intensifying air exchange with increasing energy conversion.

54388 **APTIC NO. 78815**

Giddlings, L. E., Jr.

CHEMISTRY IN THE HIGHLAND, V. DIRECT SOLAR RADIATION. *(La quimica en la altura. V. Radiacion solar directa). Text in Spanish. Afinidad, 32(323):29-35, 1975. 15 refs.*

The effects of direct solar radiation on chemistry in the highlands was investigated. Direct solar radiation is stronger in the highlands because less atmosphere attenuates it. It is assumed that sea level models of atmospheric aerosols can be applied to the highlands. Data from abbreviated tables of solar radiation and atmospheric attenuation coefficients are used to calculate the spectrum of sunlight. Tables to compensate for haze are included.

54389 **APTIC NO. 78629**

Goering, C. E. and B. J. Butler

PAIRED FIELD STUDIES OF HERBICIDE DRIFT. *Trans. ASAE (Am. Soc. Agr. Engrs.), 18(1):27-34, Jan.-Feb. 1975. 7 refs.*

Field tests with a dual spraying apparatus were conducted to investigate factors affecting herbicide drift. Drift deposits in relation to downwind distance were fitted with a curve having only slight curvature on log-log paper. A spray thickener reduced the amount of drift deposits by 49-75% and also reduced the amount of spray loss by increasing deposits within the swath. Lowering the nozzle height also decreased drift deposits. Spray loss decreased an average of 17% when nozzle pressure was reduced from 40 to 25 psi. Low temperature and high relative humidity were associated with decreased drift and decreased spray loss. Increased air turbulence produced greater spray loss but less downwind drift deposits. Increased horizontal wind speed produced greater spray loss but resulted in either greater or smaller drift deposits, depending on other meteorological factors. (Author conclusions modified)

54390 **APTIC NO. 78774**

Golshan, N. and C. F. Sechrist, Jr

SEASONAL AND SOLAR CYCLE VARIATION OF E-REGION NITRIC OXIDE. *Radio Sci., 10(3):305-315, March 1975. 58 refs.*

Measured electron density and concentration of nitric oxide +/concentration of oxygen + data are used to deduce the seasonal and solar activity variation of E-region NO concentration. There is a strong dependence of concentration of NO on soft X-rays leading to the possibility that dissociation of nitrogen by energetic photoelectrons is a major source of N(2D). Seasonal variations of the thermosphere cause enhanced concentration of NO in summer in agreement with the summer enhancement of experimental concentration of NO+/concentration of O2+. (Author abstract modified)

54391 **APTIC NO. 78821**

Harker, Alan B.

THE FORMATION OF SULFATE IN THE STRATOSPHERE THROUGH THE GAS PHASE OXIDATION OF SULFUR DIOXIDE. *J. Geophys. Res., 80(24): 3399-3401, Aug. 20, 1975. 11 refs.*

A one dimensional diffusion model was combined with literature values for the rates of gas phase sulfur dioxide oxidation reactions to calculate the stratospheric sulfate profile. The reactions of trace species such as hydroxide and HOO with SO2 are sufficiently fast to produce a sulfate layer above the tropopause similar to the observed Junge layer. The sensitivity of the model to the selection of boundary conditions and eddy diffusion profiles was investigated. (Author abstract modified)

54392 **APTIC NO. 78908**

Hayashi, M.

DIFFUSION IN THE DECAYING PROCESS OF A NOCTURNAL INVERSION. *(Setchi gyakuten-so no shogen katei ni okeru kakusan). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 10(4): 1-19, July 1975. 10 refs.*

Data on the decaying process of a nocturnal inversion measured on Nov. 29-30, 1973 were analyzed with respect to variation in the smog layer with time. The relevant atmospheric structure consists of a lid, a mixing layer with a neutral potential temperature gradient underneath the lid, and a weakly stable layer above the lid. In a mathematical simulation, a diffusion coefficient defined by combining the Deardorff s method and Wu s method was used. Parameters contained in the diffusion coefficient were obtained by comparison with measured values. The diffusion coefficient was about 5 sq m/s in both mixing layer and upper weakly stable layer, while that in the lid was smaller due to its stability. The heat transfer mechanism based on variation in the temperature profile with time was extended to the transfer of pollutants, and compared with variation in the smog layer with time. The diffusion from the source above the lid, measured by laser radar, showed the characteristics of time variation in the smog layer. Diffusion from the source in the lid or underneath the lid is restricted by the base of the lid and shows fumigation.

54393 **APTIC NO. 78511**

Hidy, G. M. and P. K. Mueller

PROGRESS AND PROBLEMS IN ATMOSPHERIC PHOTOCHEMICAL AEROSOLS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 12 refs. (Presented at the Air Pollution Control Association Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-32.10.)*

Progress and problems in atmospheric photochemical aerosol are summarized. The efforts focus on the processes leading to sulfate, nitrate, and organic particle generation. There is difficulty in distinguishing between photochemical and nonphotochemical origins for these constituents. Laboratory experiments are providing basic kinetic data that is defining better homogenous gas phase reactions leading to particle formation. The description of heterogeneous reactions remain a difficult and nebulous task. Field studies, particularly in Los Angeles, provide new data on changes in aerosol behavior, which are compatible with changes observed in gaseous smog pollutants. There are significant differences between sulfate and non-carbonate carbon, and nitrate during the daily evolution of smog. In the intensely oxidative atmosphere of Los Angeles, definite evidence of photochemical production is observed, but other urban and rural areas have not been explored. The implications to control strategy of aerosol forming processes from the pollutant gases sulfur dioxide, nitrogen oxides, and non-methane hydrocarbons are discussed. (Author abstract modified)

54394 **APTIC NO. 78934**

Hoffert, Martin I. and Richard W. Stewart

STRATOSPHERIC OZONE--FRAGILE SHIELD? *Astronaut Aeronaut., p. 42-55, Oct. 1975. 39 refs.*

The history of the ozone problem and studies on the stratospheric ozone shield are reviewed. In 1930 Sidney Chapman explained the conversion of oxygen to O3 in terms of a five step system of photolytic and collisional reactions. In 1970 the Climatic Impact Assessment Program (CIAP) was organized to deal with the problem of catalytic depletion of O3 by nitrogen oxides raised during debate over the United States SST. The various atmospheric models used in CIAP to compute the natural and SST-perturbed stratosphere are reviewed. The models differ in significant detail within a given dimensional class in chemistry, atmospheric transport and diffusion, and background levels of NOx. The Climatic Impact Committee of the National Academy of Sciences and National Academy of Engineering calculate present O3 depletion at 17 and 20 km as a function of NOx emission rates from a ID model for various types and numbers of aircraft. Les Comite D Etudes de Consequences des Vols Stratospheriques (COVOS) presented new measurements of stratospheric nitric acid that suggest the CIAP models have overestimated O3 depletion from the NOx catalytic cycle.

54395 **APTIC NO. 78478**

Hoydysh, Walter G. and Filippo Sabetta

A NEW PROCEDURE FOR CALCULATING DISPERSION IN COMPLEX TOPOGRAPHIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1975. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-17.4.)*

A procedure for calculating pollutant dispersion in complex topographies is described. The approach utilizes scale model wind tunnel results to calibrate a numerical dispersion model. This procedure of adapting computer models on the basis of wind tunnel data provides a mechanism for including the influence of topography, source geometry, building downwash, and mulitiple plume interaction and allows for more reliable dispersion estimates under other than ideal flat plate conditions. Cases dealing with building downwash in a flat terrain and normal dispersion in a complex valley are considered. The correlations obtained for the neutral wind tunnel stability condition can be extended to other atmospheric conditions, including the inversion case. Annual average, 24-hour average, and short-term average pollutant concentrations can be calculated with the procedure. (Author abstract modified)

54396 **APTIC NO. 78846**

Kalpasanov, J. and G. Kurtschatowa

A REGRESSION MODEL FOR INVESTIGATING THE INFLUENCE OF SOME METEROLOGICAL FACTORS ON THE POLLUTION IN SOFIA BY SULFUR DIOXIDE. *(Ein Regressionsmodell zur Untersuchung des Einflusses einiger meteorologischer Faktoren auf die Verunreinigung in sofia durch Schwefeldioxid). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 21(3): 212-214, 1975. 9 refs.*

A stepwise multiple regression model has been developed to describe the influence of different meteorological parameters on the sulfur dioxide concentrations in Sofia, Bulgaria. The SO2 concentrations were measured at one sampling point between 8 a.m. and noon during the July 1, 1971 through June 30, 1973 period (554 air samples). The relationships between the SO2 concentrations and 7 meteorological parameters (barometric pressure, general cloudiness, low-layer cloudiness, visibility, air temperature, relative humidity, and wind velocity) were studied. The model is suitable for the prediction of SO2 levels on the basis of the concrete meteorological conditions provided all other factors remain constant.

54397 **APTIC NO. 78819**

Kiseleva, M. S. and G. E. Sibel nikova

THE VERTICAL DISTRIBUTION OF NITROUS OXIDE CONCENTRATIONS IN THE ATMOSPHERE. *Text in Russian. Bull. Acad. Sci. (USSR) Phys. Atmos. Oceans (English translation from Russian of: Izv. Akad. Nauk. SSSR, Fiz Atmosfery i Okeana), 11(6):582-589, 1975. 18 refs.*

The solar spectra in the region of 2v1 band of nitrous oxide (3.87 micron) were measured at the altitudes up to 30 km with a balloon-borne spectrometer. The absorption function of N2O-nitrogen mixtures at 3.87 micron was determined in the laboratory with the same spectrometer. A method was developed for the determination of atmospheric absorbing gas concentration based on altitude absorption measurement with the sun under a geometrical horizontal line. The N2O volume concentration up to 30 km has a near constant value of c equals 0.3 ppm.

54398 **APTIC NO. 78759**

Lebedeff, S. A. and S. Hameed

STUDY OF ATMOSPHERIC TRANSPORT OVER AREA SOURCES BY AN INTEGRAL METHOD. *Atmos. Environ., 9(3):333-338, March 1975. 7 refs.*

An approximate solution of the steady state two dimensional diffusion equation, obtained by an integral method, is presented. The solution is used to predict dispersion of pollutants in the atmosphere over an area source such as an urban area. The method is applied to the calculation of sulfur dioxide concentration distribution over a 2-hour period in Nashville, Tenn. Calculated values agree well with observations in terms of both the correlation coefficient and the magnitude of relative error. (Author abstract modified)

54399 **APTIC NO. 78884**

Manier, G.

COMPARISON BETWEEN DISPERSION CLASSES AND TEMPERATURE GRADIENTS. *(Vergleich zwischen Ausbreitungsklassen und Temperaturgradienten). Text in German. Meteorol. Rdsch., 28(1):6-11, 1975. 3 refs.*

Diffusion categories determined according to Turner s and Klug s methods from synoptic weather observations were compared with temperature gradients measured between 2-50 m, 50-70 m, 70-110 m, 110-175 m, and 175-250 m during the 1965-1966 period. There was no good agreement between the Turner and Klug dispersion categories, and none between the measured temperature gradients and either the Turner or Klug dispersion categories, especially during the hours around sunset and sunrise. A highly stable temperature gradient may be associated with a dispersion category suggesting indifferent or labile temperature stratification, and vice versa. The correlation can be improved by a modification of Klug s classification, and by taking the prehistory of the cloud cover and wind velocity, as well as local conditions into account.

54400 **APTIC NO. 78516**

Mastenbrook, H. J. and D. R. Purdy

VERTICAL DISTRIBUTION OF WATER VAPOR AND OZONE OVER WASHINGTON, D. C., DURING 1971

THROUGH 1973 (FINAL REPORT). Dept. of the Navy, Washington, D. C., Naval Research Lab., NRL Problem A03-09-A37540/652/69-R004-02-01, Rept. NRL 7884, 172p., May 1975. 9 refs.

Measurements of the vertical distribution of water vapor and ozone in the stratosphere at heights to 100,000 feet have been obtained at approximately one-month intervals. Measurements were made with balloons. Data are presented in tables and graphs, intended for study of radiation budget, stratospheric chemistry, and general circulation. Values for pressure, air temperature, frost-point temperature, ozone partial pressure, water vapor mass mixing ratio and ozone mass mixing ratio are included for all datum levels. Instrumentation and data processing are briefly discussed. (Author introduction modified)

54401 **APTIC NO. 78959**

McMullen, Robert W.

THE CHANGE OF CONCENTRATION STANDARD DEVIATIONS WITH DISTANCE. *J. Air Pollution Control Assoc., 25(10):1057-1058, Oct. 1975. 1 ref.*

A mathematical equation was developed which gives the values of the horizontal and vertical standard deviations of plume concentrations distributions as a function of downwind distance. The departure from values given by Turner s figures is generally less than 2% and averages less than 1% for the horizontal standard deviation. The departure for the vertical standard deviation is generally less than 4% and averages less than 2%. Departures of this magnitude are trivial compared to other uncertainties in the calculations of pollutant concentrations.

54402 **APTIC NO. 78700**

McNeil, W. R. and A. I. Carswell

LIDAR POLARIZATION STUDIES OF THE TROPOSPHERE. *Appl. Opt., 14(9):2158-2168, Sept. 1975. 6 refs.*

The polarization properties of lidar backscattering from the atmosphere were measured using a ruby system operating at 694.3 nm and 347.2 nm. Linearly polarized signals are transmitted, and multiple receiver channels simultaneously sample the return with polarizers oriented parallel and perpendicular to the transmitted polarization. Air quality measurements made in metropolitan Toronto, Ontario under conditions of clean air, mixing boundary layers, fog, and haze are used for data. There is a definite correlation between high depolarization ratios and poor atmospheric quality. On days with high pollution counts the depolarization ratios are above the average. Low depolarization ratios are usually observed in high humidity. Depolarization tends to increase as the relative humidity decreases in the lower atmosphere. Rain, snow, and water vapor droplets have radically different polarization signatures and can be readily identified along with the contributions from multiple scattering. (Author abstract modified)

54403 **APTIC NO. 78768**

Meinel, Aden B. and Marjorie P. Meinel

STRATOSPHERIC DUST-AEROSOL EVENT OF NOVEMBER 1974. *Science, 188(4187):477-478, May 2, 1975. 8 refs.*

A strong incurison of dust and aerosol at an altitude of 20 km was noted over Baja, Calif. and southern Arizona in mid-Nov. 1974. There were bluish ashen daylight skies and colorful twilight glows of the type usually associated with volcanic eruptions. The glows grew in intensity for about a week after the last sighting of the daylight ash stratum. This indicates that the enhanced aerosol layer is somewhat different from the ash cloud itself, consistent with the hypothesis that the aerosol enhancement is a photochemical smog from the reaction of sulfur dioxide with ozone to form sulfate particles. Infrared satellite observations and reports from other sources eliminate a possible oceanic origin in the eastern Pacific. The stratum is probably from the extensive eruption of Volcan de Fuego in Gautemala in Oct. 1974. (Author abstract modified)

54404 **APTIC NO. 78769**

Monro, P. E. and L. G. Smith

DETERMINATION OF NITRIC OXIDE CONCENTRATIONS FROM SUNRISE E-REGION ELECTRON DENSITY MEASUREMENTS. *Radio Sci., 10(3): 317-323, March 1975. 19 refs.*

Midlatitude sunrise electron density profiles were analyzed to determine nitric oxide concentrations in the range 100-160 km. The determinations are restricted to heights for which the ionization of NO by direct solar Lyman-alpha radiation is the main contribution to the growth of the E region. The concentrations obtained are larger, by factors of approximately 3 to 4, than those obtained from the midlatitude airglow measurements of other workers. Concentrations are obtained from one sunset measurement and are significantly lower than the sunrise values. Nitric oxide concentrations increase above 120 km with increasing solar activity. (Author abstract modified)

54405 **APTIC NO. 78936**

Noxon, J. F.

NITROGEN DIOXIDE IN THE STRATOSPHERE AND TROPOSPHERE MEASURED BY GROUND-BASED ABSORPTION SPECTROSCOPY. *Science, 189(4202): 547-549, Aug. 15, 1975. 9 refs.*

The measurement of nitrogen dioxide in the stratosphere and troposphere by ground based absorption spectroscopy is described. The NO2 abundance in the stratosphere was determined from ground based spectra of the rising and setting sun and moon and of the twilight sky near 4500 A. The spectra were taken at an altitude of 3 km in the Colorado mountains. Separation of the stratospheric contribution requires observations at a relatively unpolluted site. Direct measurement of the tropospheric absorption in the Colorado mountains often yields an upper limit on the tropospheric mixing ratio of 0.1 ppb. The stratospheric NO2 abundance is two or three times greater at night than during the day and increases significantly during the course of a sunlit day. These changes are related to photolytic decomposition of NO2 and nitric anhydride in the daytime stratosphere. Absorption by nitrogen trioxide was sought, but not found. There is an upper limit of 2% on the nighttime abundance ratio of NO3 to NO2 in the stratosphere. (Author abstract modified)

54406 **APTIC NO. 78453**

Otaki, A., K. Shiozawa, and S. Okamoto

STATISTICAL PREDICTION OF AIR POLLUTANT CONCENTRATION (I). *(Taiki osenshitsu nodo no tokeiteki yosoku hoshiki ni kansuru kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(3):544, 1975.*

The statistical forecast theory for air pollution control is studied. A model of the variation of air pollutant concentration is proposed for the case of sulfur dioxide. The validity of the proposed model is examined by the analysis of correlograms of SO2 concentrations observed at monitoring stations in Tokyo, Saitama, Chiba Prefecture, Yokohama, and Kawasaki City. The mixed model of the synthetic type of periodical variations and the auto-regressive type is satisfactory for use as the statistical model of variation of air pollutant concentration. The correlograms can be classified into nine patterns according to periodicity, persistencies of 24-hr periods, and 1-hr periods.

54407 **APTIC NO. 78754**

Padmanabhamurty, B.

EIGENVECTORS OF SULPHUR DIOXIDE IN METROPOLITAN TORONTO AND THEIR ASSOCIATION WITH METEOROLOGICAL PARAMETERS. *Atmos. Environ., 9(3):365-366, March 1975. 4 refs.*

The interrelationship between eigenvector coefficients and some commonly measured meteorological parameters was determined. Daily average sulfur dioxide concentrations for 2 yr at 13 sites through metropolitan Toronto, Ontario are used. The partial and multiple correlation coefficients were calculated. Wind direction and wind speed are the dominant factors in the interrelationship. (Author abstract modified)

54408 APTIC NO. 78976

Rahbar, M.

INFLUENCE OF THE ALTITUDE OF THE TROPOPAUSE ON THE VARIATIONS OF OZONE AND RADIOACTIVITY IN THE LOWER LAYERS OF THE ATMOSPHERE. *(Influence de la hauteur de la tropopause sur les variations de l ozone et de la radioactivite dans les basses couches). Text in French. Meteorologie, vol. 33:71-79, Jan.-March 1975. 13 refs.*

Comparison of artificial radioactivity with ozone concentration near the ground at the Kerguelen Islands (49 deg 21 min south, 70 deg 17 min east) during the yr 1967 and 1968 shows that in most cases an increase of the atmospheric radioactivity is accompanied by an increase in ozone. The probability of this correlation is greater for the strong increases of radioactivity. The strong increases in radioactivity nearly always occurred after an important rise of the tropopause. (Author abstract)

54409 APTIC NO. 78569

Ramanathan, V.

GREENHOUSE EFFECT DUE TO CHLOROFLUOROCARBONS: CLIMATIC IMPLICATIONS. *Preprint, George Washington Univ., Hampton, Va., Joint Inst. For Acoustics and Flight Sciences, 15p., 1975. 14 refs.*

The impact on the overall thermal energy balance of the earth atmosphere system due to a significant build up in the concentrations of fluorocarbons and chlorocarbons was determined. The primary reason for this expected build up is the lack of any significant tropospheric removal mechanisms for these compounds. The increase in the surface temperature caused by the reduction in net infrared radiative flux due to the infrared bands of the fluorocarbons and chlorocarbons is computed. Only bands in the 8-12 micron region are considered since these bands are stronger by two orders of magnitude than bands located elsewhere in the infrared spectrum. The infrared bands of fluorocarbons and chlorocarbons enhance the atmospheric greenhouse effect. The enhancement in the greenhouse effects may lead to an appreciable increase in the global surface temperature if the atmospheric concentrations of fluorocarbons and chlorocarbons reach values of the order of 2 ppb. (Author abstract modified)

54410 APTIC NO. 78761

Randall, C. M.

INFRARED ATMOSPHERIC EFFECTS. *Opt. Eng., 14(1):31-37, Jan./Feb. 1975. 39 refs.*

The basic processes leading to the absorption, emission, and scattering of infrared radiation in the atmosphere below 70 km are reviewed. Methods exist for computing reliably at both low and high spectral resolution the absorption caused by gases in the atmosphere. The ability to model aerosols and clouds computationally is not as adequate, principally because of the difficulty of completely characterizing these sources of scattering. Derivations of atmospheric composition and meteorological information from infrared observations of atmospheric radiance and transmittance are examples of the application of infrared atmospheric effects. (Author summary modified)

54411 APTIC NO. 78755

Smith, F. B.

TURBULENCE IN THE ATMOSPHERIC BOUNDARY LAYER. *Sci. Prog. (Oxford), 62(245):127-151, Spring 1975. 41 refs.*

Estimates of turbulence in the atmospheric boundary layer are calculated. Quasi random motions, correlated in time and space, are generated within the lowest 2 km of the atmosphere as a result of the drag of the underlying surface on the wind, and by buoyancy forces when the lower layers are warmed by contact with the ground. These motions are called turbulence and are important in determining the vertical profiles of temperature, humidity, and wind speed and how much heat and moisture are transferred from the surface into the main body of the atmosphere. Two major sources of turbulence within the micrometeorological part of the spectrum are the instability of the wind shear within the boundary layer above the earth s surface and the work done by buoyancy forces arising from the flux of heat and water vapor away from the ground. (Author abstract modified)

54412 APTIC NO. 78910

Stampfer, J. F., Jr. and J. A. Anderson

LOCATING THE ST. LOUIS URBAN PLUME AT 80 AND 120 KM AND SOME OF ITS CHARACTERISTICS. *Atmos. Environ., 9(3):301-313, March 1975. 15 refs.*

The feasibility of locating the urban plume of a moderately large urban area, as far as 120 km downwind, is shown. The method utilizes a single engine aircraft and aerosol instrumentation. The concentration of particles in two size ranges was measured: approximately 0.15 to 0.3 micron and 0.3 to 1.3 micron. The St. Louis urban plume was successfully located 34 times out of 45 sampling runs during an 8 mo period. A summary of the data obtained from the 34 flights is presented and the problems involved in interpreting the data are discussed. These difficulties include nonuniform background levels outside the plume, changing relative humidity, low wind speeds, sources operating outside but upwind of the urban area, and effluent injected and trapped in very stablle layers. The plume was characterized by concentrations of small particles, with radii between 0.15 micron and 0.3 micron, between 1.3 and 1.7 times that in background air and concentrations of large particles, with radii between 0.3 micron and 1.3 micron, usually between 1.8 and 2.5 times that in the background. The ratio of the concentrations of small particles to large particles in the plume was about one half of that in the background. (Author abstract modified)

54413 APTIC NO. 78817

Stensland, Gary J. and Rosa G. dePena

A MODEL OF BELOW-CLOUD PRECIPITATION SCAVENGING OF NACL. *J. Geophys. Res., 80(24):3410-3418, Aug. 20, 1975. 28 refs.*

The influence of meteorological parameters on the composition of rainwater and the atmospheric aerosol content was investigated with a numerical model constructed to simulate the scavenging of hygroscopic aerosols. The scavenging mechanism is highly dependent on the relative humidity, the rainfall intensity, and the chemical nature of the particles. With the assumption of no particle replenishment, only 20% of the initial aerosol mass remains in the subcloud layer after 4 mm rainfall for the best scavenging conditions and after 15 mm rainfall for the worst conditions. After these rainfalls, changes in the rainfall intensity and relative humidity have little effect on the average rainwater concentration, since little aerosol mass remains to be scavenged. The model predictions of average rainwater concentration variations due to meteorological parameter changes are consistent with values actually measured. (Author abstract modified)

54414 APTIC NO. 78624

Sticksel, Philip R.

THE STRATOSPHERE AS A SOURCE OF SURFACE OZONE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1975. 23 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-07.6.)*

Atmospheric ozone measurements made with an extensive series of balloon measurements are reviewed, with particular emphasis on the stratosphere serving as a source of surface ozone. Stratospheric ozone concentrations are at a maximum in the spring and decrease to a minimum in the fall, with the decrease resulting from injections of stratospheric ozone into the troposphere where the ozone is ultimately destroyed. Analyses of ozonesonde soundings indicate that ozone may be well-mixed throughout the entire troposhere. During the day as a result of photochemical creation, the surface layer ozone in urban areas is observed to increase to concentrations greater than those in the layers above. Under these conditions, there can be down-gradient mixing from the surface source upward to the layers above it. However, if the ozone concentrations within the overlying layer are large enough, turbulent mixing after the nocturnal inversion disappears can create surface ozone concentrations in excess of air quality standards even though all surface emissions are discontinued. This downwardly mixed ozone is subject to normal destruction processes within the surface layer.

54415 **APTIC NO. 78749**

Threadgill, E. Dale and David B. Smith

EFFECTS OF PHYSICAL AND METEOROLOGICAL PARAMETERS ON THE DRIFT OF CONTROLLED-SIZE DROPLETS. *Trans. ASAE (Am. Soc. Agr. Engrs.), 18(1):51-56, Jan.-Feb. 1975. 11 refs.*

A surface spray vehicle was used in conducting field tests designed to measure air drift deposits for a variety of physical properties of the sprayed liquid and a variety of meteorological conditions. Drift samples were collected for 26.67 ft downwind along the top of the canopy and to a height of 20 ft above the canopy. The range of specific gravities (0.82-1.03) used is not sufficient to determine any definite effect of specific gravity upon drift. As the atmospheric stability increases, the potential of sprays to drift decreases. As the size of the droplets in a spray increases, the drift potential decreases. The drift potential of droplets larger than 140 microns in diameter is negligible for a wide range of atmospheric conditions. As the upward component of wind speed increases, the drift potential increases. An increase in horizontal wind speed results in a decrease in drift, particularly at lower wind speeds. (Author summary modified)

1974

54416 **APTIC NO. 78933**

Bewers, J. M. and H. H. Haysom

THE TERRIGENOUS DUST CONTRIBUTION TO FLUORIDE AND IODIDE IN ATMOSPHERIC PRECIPITATION. *J. Rech. Atmospheriques, 8(3-4):689-697, July-Dec. 1974. 31 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

The terrigenous dust contribution to levels of fluoride and iodide in atmospheric precipitation is discussed. Fluoride and iodide have higher ratios to chloride in atmospheric precipitation than in seawater. While experimental evidence exists to propose a marine origin for the excess iodide, recent analyses indicate that fluoride is depleted in marine aerosols. This suggests a non-marine origin for the excess fluoride and airborne terrigenous dust is proposed as an alternative source. It is calculated that terrigenous dust, transported through the troposphere, does not account for more than 2% of the iodide and 4% of the fluoride in atmospheric precipitation. Unless injections from anthropogenic and volcanic activities are underestimated or other major sources exist, the oceans are the primary source of atmospheric iodide and fluoride and large positive enrichment occurs in the sea to air transport of these elements. (Author abstract modified)

54417 **APTIC NO. 78527**

Bricard, J., P. Delattre, and G. Madelaine

COUNTING OF CONDENSATION NUCLEI AT LOW PRESSURES: ITS APPLICATION TO PHOTOLYSIS OF GASEOUS IMPURITIES IN THE STRATOSPHERE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 168-172, 6 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

A continuous flow counter for condensation nuclei was developed and applied at pressures below 760 torr, down to 60 torr. A drop in the counting efficiency at decreasing pressures was noticed. This problem was solved by increasing the supersaturation in the counter. The equipment was used to study the formation of particles by photolysis of the gaseous impurities of the air at low pressure. Low pressures do not prevent the formation of particles by photolysis. (Author abstract modified)

54418 **APTIC NO. 78674**

Brocco, D. and M. Possanzini

PHOTOCHEMICAL SMOG AND ITS EVALUATION. *(Log smog fotochimico e la sua valutazione). Text in Italian. Rev. Combust., 28(9): 320-328, Sept. 1974. 72 refs.*

A review of the formation and effects of photochemical smog and the methods of evaluating its presence in the atmosphere is given, with special emphasis on the chemical mechanisms. A graph is shown of the average daily concentrations of photochemical pollutants over the city of Rome, Italy, in May 1973 (nitrogen oxides, ozone, formaldehyde and non-methane hydrocarbons); there are diagrams of photochemical cycles in the atmosphere, and figures are given of average emission factors for stationary and mobile sources of pollution, classified by type of fuel and type of substances emitted.

54419 **APTIC NO. 78560**

Chang, J. S. and H. S. Johnston

THE EFFECT OF NOX EFFLUENTS ON OZONE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 323-329, 19 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The results of model calculations of the reduction of stratospheric ozone by nitrogen oxides from supersonic transport exhausts, carried out by eight groups between 1971 and 1974, are assembled. The spread in calculated reductions of ozone for a given rate of input of nitrogen oxides is about a factor of 10. Some of this spread can be traced to differences in the chemistry of the models. However, the greatest source of discrepancy appears to be different treatments of eddy diffusion and boundary conditions. The eight models show a surprisingly close agreement in percent ozone reduction as a function of percent increase in the NOx column; doubling stratospheric NOx is calculated to reduce ozone by 20%. (Author abstract)

54420 **APTIC NO. 78561**

Chang, Julius S.

SIMULATIONS, PERTURBATIONS, AND INTERPRETATIONS. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 342-358, 31 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

The parameterization of various physical processes simulated by parameterized-transport and chemical-kinetics models of the stratosphere is analyzed. An analysis of the coupling of various physical and chemical processes is provided. Although it is limited to one dimensional models, much of what is said applies equally well to two dimensional models. The perturbational studies made with these models and the restrictions on the interpretation of simulation results are also analyzed. (Author abstract modified)

54421 **APTIC NO. 78552**

Cunnold, D. M., F. N. Alyea, N. A. Phillips, and R. G. Prinn

PRELIMINARY RESULTS OF THE M.I.T. PHOTOCHEMICAL-DYNAMICAL OZONE MODEL. *Dept. of Transportation, Washington, D. C., Climat. Impact. Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 403-421, 33 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

A general circulation model currently under development is reported, whose ultimate objective is the assessment of the effect of increased stratospheric flight on the atmospheric ozone distribution. The model variables are represented in the spectral domain in terms of 79 spherical harmonics and 26 vertical levels between the ground and 70 km. The results of a 3 yr integration which simulated the unperturbed global ozone distribution are presented. The model shows the presence of a westerly stratospheric jet in the winter hemisphere with an amplitude similar to those observed in the polar-night jet; easterlies dominate in the summer hemisphere. The model also shows ozone to be transported polewards and downwards. Furthermore, the annual ozone-concentration cycle at mid-latitudes has been simulated. Preliminary comparisons are also made with other features of the dynamics and the ozone distribution in the stratosphere. (Author abstract)

54422 **APTIC NO. 78518**

Danielsen, E. F. and Dennis Deaven

METHODS FOR DERIVING A TWO-DIMENSIONAL TRANSPORT MODEL. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 83-90, 7 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

An analysis method has been developed that produces the three dimensional velocity field over the northern hemisphere at points which are uniformly distributed in space and time, directly from observations. The three components of the velocity are obtained from isentropic trajectories that are centered at each of the regularly spaced grid points. These values are necessary for two dimensional transport models predicting the concentrations of trace constituents in the stratosphere. (Author abstract modified)

54423 **APTIC NO. 78533**

Farmer, C. B., O. F. Raper, R. A. Toth, and R. A. Schindler

RECENT RESULTS OF AIRCRAFT INFRARED OBSERVATIONS OF THE STRATOSPHERE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 234-245, 23 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The analysis of stratospheric spectral data obtained during a series of recent flights with a near-infrared high speed stepping interferometer, on board a supersonic airplane, was provided information on the mixing ratios for such species as nitric oxide, nitrogen dioxide, nitrous oxide, carbon monoxide, carbon dioxide, methane, ozone, and water vapor. The application of deconvolution techniques to the spectra from these flights has increased the spectral resolution and resulted in the determination of more accurate values for the mixing ratios of several of these trace species, as well as new upper limits for others. There was an apparent difference between the relative absorptions of the different N2O bands in the spectra and the relative intrinsic strengths of the bands. The intensities of the two most reliable bands were therefore measured in the laboratory. The revised laboratory values gave consistent results for the N2O abundances derived from different bands in the observed stratospheric spectra so they were adopted for reanalysis of the data obtained in flight. It is possible that the difficulties of spectral fitting are the cause of a systematic underestimation of the true absorption of N2O in this region, resulting in a low estimate of the N2O mixing ratio. The values for the mixing ratios and their latitudinal variations are discussed for all the trace gases observed to date. (Author abstract modified)

54424 **APTIC NO. 78559**

Fernald, F. G., C. L. Frush, and B. G. Schuster

AIRBORNE LIDAR MEASUREMENTS OF THE DISTRIBUTION OF STRATOSPHERIC AEROSOLS. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 318-322, 10 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Airborne lidar measurements of stratospheric aerosols were collected during February, March, and April of 1973. An extensive portion of the northern hemisphere was covered on flights that ranged from 0 degrees to 150 degrees west and from the equator to 85 degrees north. The results show a Junge layer (20-24 km) whose maximum scattering ratio varies between 1.1 and 1.2, considerably lower than measurements recorded during the 1960 s. Latitudinal and longitudinal variations in the aerosol concentrations are interpreted in relation to the stratospheric temperature and wind field. The distribution of stratospheric aerosols is quite variable in space and time, but highly organized when compared with the corresponding isentropic analyses of meteorological data. (Author abstract modified)

54425 **APTIC NO. 78558**

Ferry, Guy V. and Homer Y. Lem

AEROSOLS IN THE STRATOSPHERE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 310-317, 13 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

An aerosol-collecting instrument was flown to collect particles by direct impaction from the 9 to 12 km altitude range and at 20 km altitude. The palladium wire sampling surfaces were examined using a scanning electron microscope. Particles as small as 0.06 micron in diameter were detectable. Elemental analyses of selected particles with a diameter of 0.5 micron or larger detected elements of atomic number 11 (sodium) and higher. Average concentrations were 10 particles/cu cm, with three- or fourfold variations common. Two morphological types of particles were collected in the 9 to 12 km altitude range: a ring-structure type composed of a central particle surrounded by large numbers of smaller particles, and a rosette type with a flat, dendritic, leaflike structure. Individual collections were always composed entirely of one type. Most of the ring-type particles appear to be solid particles coated with liquid. These were composed of various combinations of aluminum, calcium, iron, silicon, and sometimes sulfur. A few appeared to be all liquid. Sulfur was the only element in those. Only sulfur was detected in the rosette-type particles, apparently a slurry that had flattened out on collection. Preliminary analyses of collections at 20 km altitude indicate concentrations and variations in concentration similar to those in the 9 to 12 km altitude range. Three morphological types have been found: ring-structure, crystal, and irregular-solid. Elemental compositions of these particles were similar to the ring-structure-type particles found at 9 to 12 km altitude. (Author abstract)

54426 **APTIC NO. 78532**

Fontanella, Jean-Claude, Andre Girard, Louis Gramont, and Nicole Louisnard

VERTICAL DISTRIBUTION OF NO, NO2, AND HNO3 AS DERIVED FROM STRATOSPHERIC ABSORPTION INFRARED SPECTRA. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 217-233, 20 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The results of nitric oxide, nitrogen dioxide, and nitric acid measurements made in June and July 1973 from a supersonic airplane are presented. The flight altitude was about 16 km. The experimental method is based on infrared absorption spectrometry, using the sun as a source at sunset or sunrise. Nitric oxide is concentrated in stratospheric layers above the flight altitude. The integrated amount of NO along the optical path is 4 + or - 1.5 times 10 the 16th power molec/sq cm for a solar elevation varying from +2 deg above the horizontal plane to -1 deg. A value of 6 times 10 the 8th power molec/cu cm is derived as an upper limit for the local concentration at the flight altitude. There is no significant difference between the integrated amounts observed at sunset and at sunrise. The measured value of NO2 local concentration at 15.5 km is 1.1 + or - 0.2 times 10 to the 9th power molec/cu cm under sunset conditions. This value does not vary significantly between 15 km and 30 km. The measured value of NHO3 local concentration at 15.5 km is 1 + or - 0.3 times 10 to the 10th power molec/cu cm, increasing with altitude between 15 and 20 km. The local concentration is maximum at 20 km, where the measured value is 2 + or -1 times 10 to the 10th power molec/cu cm; it seems to decrease rapidly above 20 km. (Author abstract modified)

54427 **APTIC NO. 78860**

Fumarola, G., D. DeFaveri, E. Palazzi, and M. Del Borghi

MODEL STUDY OF THE ATMOSPHERIC DISPERSION OF POLLUTANTS. PART 2: PRELIMINARY RESULTS OF HYDRODYNAMIC MODEL EXPERIMENTS. *(Studio mediante modelli della dispersione degli inquinanti nell atmosfera. II. Risultati preliminari da sperimentazioni su modello idrodinamico. Text in Italian. Riv. Combust., 28(11-12):403-408, Nov.-Dec. 1974, 6 refs.*

A hydrodynamic model for the study of the atmospheric dispersion of gaseous pollutants is described. An initial series of experimental data is presented and compared with those obtained by the mathematical formulas reported in the literature, generally used for the calculation of dispersion systems.

54428 **APTIC NO. 78548**

Gal-Chen, Tzvi and Stephen H. Schneider

RADIATIVE AND DYNAMIC FEEDBACK MECHANISMS COMBINED IN AN ENERGY-BALANCE CLIMATE MODEL. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 450-456, 15 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The semi-empirical climate modeling approach is formulated as a time-dependent problem in order to study the stability of its asymptotic solutions to perturbation in external and internal conditions. Four dynamical parameterizations have been tried in order to find what effect, if any, each would have on the climate. A 1% decrease in the solar constant results in a global surface temperature change between 3.34 K and 5.38 K, depending upon the particular form of dynamical parameterization. The radiation balance is the primary factor in determining the qualitative features of the model's climate. However, the horizontal and vertical distributions of temperature are influenced by the dynamics. For fixed external conditions the solutions exhibit different steady-state solutions for different initial conditions. Nevertheless, in order for this intransitivity to occur, an unrealisticeally large negative temperature perturbation, more than 19 K, has to be applied to the initial condition. Numerical experimentation with these models suggests that the radiation balance in equatorial latitudes has a controlling influence on the extent of the polar ice caps. (Author abstract modified)

54429 **APTIC NO. 78523**

Grobecker, Alan J.

PROGRESS REPORT ON THE CLIMATIC IMPACT ASSESSMENT PROGRAM. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 1-15, 36 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The data compiled by the Climatic Impact Assessment Program have been gathered into six monographs. Monograph I discusses the physical characteristics of the natural stratosphere, with particular attention to ozone. Monograph II describes aircraft engines, both present and future, and the routes and frequencies of the travel during which these engines would introduce emission products into the stratosphere. Monograph III describes the possible consequences of perturbing the stratosphere by the introduction of engine effluents. Monograph IV describes effects on the troposhere of perturbation of the stratosphere. Monograph V describes biologic responses to climatic and radiation changes resulting from stratospheric and tropospheric perturbations. Monograph VI describes the economic and social costs of the changes in the biosphere, as well as the costs of feasible abatement measures. The question of regulation itself is also described in Monograph VI, including the legal basis. It is suggested that the total emission into the stratosphere of nitrogen oxides which could produce the smallest discernable trend of global ozone could be the limit used to establish the tolerable size of the stratospheric fleet.

54430 **APTIC NO. 78529**

Harries, J. E., J. R. Birch, J. W. Fleming, N. W. Stone, D. G. Moss, N. R. W. Swann, and G. F. Neill

STUDIES OF STRATOSPHERIC H2O, O3, HNO3, N2O, and NO2 FROM AIRCRAFT. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 197-212, 30 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Improved emission spectra of nitric acid, nitrogen dioxide, and nitrous oxide in the wavelength region beyond 250 micron are presented. The sky emission spectrum itself is briefly described. Geographical studies of column-density variability are reviewed. They indicate known seasonal and latitudinal variations for ozone and water vapor, and give mean levels of HNO3 and N2O across the globe, but show no evidence of marked latitudinal or seasonal variations. Measurements of vertical distribution in the lower stratosphere are reported. The data agree well with other results, and for water vapor and ozone they fit well, within accepted variations as a function of height above tropopause. (Author abstract modified)

54431 **APTIC NO. 78526**

Lazrus, A. L. and B. W. Gandrud

PROGRESS REPORT ON DISTRIBUTION OF STRATOSPHERIC NITRIC ACID. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 161-167, 14 refs. (Feb. 26-March.1)*

NTIS, DDC: A003846

Samples were collected in the stratosphere in aircraft balloon experiments by adsorption in impregnated cellulose fiber filters and polystyrene filter papers. Use of the two types of filters made it possible to distinguish between particulate nitrate and nitric acid vapor. Sampling took place over North and South America. Nitric acid is concentrated in a layer beginning at about 20 km and extending to 27 km above, depending on latitude. The concentrations increase from equatorial to poleward latitudes. The present data suggest higher concentrations in winter and spring than in summer and mid-fall. The nitric acid is not significantly associated with natural stratospheric sulfate aerosol. The rate of removal of nitric acid from the stratosphere corresponds well with the estimated rates of production of odd-nitrogen molecules. (Author abstract modified)

54432 **APTIC NO. 78612**

Liu, M. K., S. D. Reynolds, P. M. Roth, and J. H. Seinfeld

A PHOTOCHEMICAL AIR POLLUTION MODEL FOR THE LOS ANGELES AIR BASIN. *Oregon State Univ., Corvallis, Oreg., Heat Transfer Fluid Mech. Inst., 24th, Corvallis, Oreg., 1974, p. 287-293. 13 refs. (Jan. 12-14, Paper 18.)*

An air pollution simulation model capable of predicting concentration levels of carbon monoxide and the major photochemical pollutants, nitric oxide, nitrogen dioxide, ozone, and hydrocarbons in the Los Angeles air basin is described. The model is based on the numerical solution of the three dimensional, time dependent, species conservation equations, including chemical reactions. Wind fields for the airshed have been generated using an automated scheme based on the interpolation of a two dimensional array of wind speed and direction measurements. A comprehensive emissions model and inventory for the Los Angeles basin, one having 2-mile spatial resolution and a 1-hour temporal resolution, has also been developed. The chemical transformations of thee photochemical pollutants, after their release from the emission sources, are described by a photochemical mechanism. The model was applied to the simulation of a smoggy day in Los Angeles, September 29, 1969. The predicted ground level concentrations of both the primary and secondary pollutants were compared with the measured values at more than a dozen monitoring stations. The results are generally good. Shifting, both in space and time, of peak concentrations often occurred; this is apparently due to the inaccuracies of the wind directions in the input. Because of the magnitude of the discrepancy between the usually large spatial resolution of the model and the smaller volume of space actually represented by an observation made at a monitoring station, predictions and observations are not directly comparable. Thus actual evaluation and verification of the model is difficult. (Author abstract modified)

54433 **APTIC NO. 78530**

Loewenstein, M., J. P. Paddock, I. G. Poppoff, and H. F. Savage

IN-SITU NO AND O3 MEASUREMENTS IN THE LOWER STRATOSPHERE FROM A U-2 AIRCRAFT. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 213-215, 3 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Simultaneous, in situ, measurements of nitric oxide and ozone in the lower stratosphere were made from high altitude research aircraft. Nitric oxide was measured with a chemiluminescence analyzer, and ozone was measured by means of optical absorption. Data are presented for 18 km and 21 km flight altitudes. The three sets of measurements reported were carried out in December 1973 and January 1974 along meridian 122 deg west between 38 deg and 48 deg north latitude. All data were gathered within 2 hr of local noon. The observed NO concentrations at 21 km for the three flights ranged from 0.5 + or - 0.3 times 10 to the 8th power to 3.0 + or - 0.8 times 10 to the 8th power molec/cu cm. (Author abstract)

54434 **APTIC NO. 78549**

Luther, Frederick M. and Michael C. MacCracken

INITIAL VALIDATION STUDIES FOR ZAM2 RADIATION AND LARGE-SCALE EDDY TRANSPORT MECHANISMS. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 437-449, 29 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The second-generation zonal atmospheric model has been undergoing intensive development and validation in order to prepare it for assessing the potential climatic impact of the stratospheric injection of trace species by high-altitude aircraft. Trace-species transport is included for both radiatively active and radiatively passive species. The radiation prescription has been improved so that ozone absorption is now treated on the basis of the amount of ozone present. (Author abstract modified)

54435 **APTIC NO. 78575**

Molenkamp, Charles R.

NUMERICAL MODELING OF PRECIPITATION SCAVENGING BY CONVECTIVE CLOUDS. *Preprint, California Univ., Livermore, Lawrence Livermore Lab., 41p., Sept. 1974. 18 refs. (Presented at the Precipitation Scavenging Symp., Champaign, Ill., Oct. 14-18, 1974.)*

NTIS: VCRL-75896

A one-dimensional model of cumulus convection with parameterized microphysics modified to include a scavenging calculation is presented. The model indicates that a typical convective cloud can easily deposit efficient condensation nuclei initially suspended at low levels in amounts equal to the initial vertical integral of the pollutant material. Several initial vertical integrals can be rained out for larger clouds and greater nucleation efficiencies. The amount of pollutant left behind in the atmosphere in the vertical column where the cloud existed can be larger than the initial vertical integral of pollutant even when the material is efficiently scavenged. This result indicates that the region of the atmosphere that possesses a small amount of pollutant after being influenced by convective clouds in the region between clouds where air with a lower concentration of pollutant was advected to lower levels replacing air with a higher concentration of the pollutant.

54436 **APTIC NO. 78542**

Murcray, D. G., A. Goldman, W. J. Williams, F. H. Murcray, J. N. Brooks, J. Van Allen, R. N. Stocker, J. J. Kosters, D. B. Barker, and D. E. Snider

RECENT RESULTS OF STRATOSPHERIC TRACE-GAS MEASUREMENTS FROM BALLOON-BORNE SPECTROMETERS. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 184-192, 20 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Atmospheric absorption and emission infrared spectra are analyzed in terms of mixing ratios of trace gases in the lower stratosphere. The emission technique is applied to recent observations of water vapor spectra in the 25 micron region and to nitric acid spectra in the 11.3 micron region. The sunset technique for determining mixing ratio profiles from absorption spectra is discussed and applied to H2O and nitrogen dioxide in the 6 micron region. Each of the H2O profiles shows an indication of a layer in the 20 km to 25 km region. The main variability in HNO3 data from several balloon flights is in the altitude of the bottom of the layer. Nitric acid data are compared with those obtained by previous investigators and are within the same order of magnitude. (Author abstract modified)

54437 **APTIC NO. 78546**

Newson, R. L.

AN EXPERIMENT WITH A TROPOSPHERIC AND STRATOSPHERIC THREE-DIMENSIONAL GENERAL-CIRCULATION MODEL. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 461-474, 11 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The general circulation model of the British Meteorological Office has been revised and extended. It now has 13 levels distributed through the troposphere and stratosphere; in addition to the variables of wind, temperature and moisture, ozone is carried as a predictive parameter. The results of the first experiment with a hemispheric version of the model are described, in which an attempt is made to simulate January conditions. For a considerable period, the experimental troposphere and stratosphere are in a state of quasi-equilibrium simulating a characteristic winter state. The polar night jet in the stratosphere is well represented, but it is too strong and temperatures in the polar vortex are excessively low. There is then a radical change in stratospheric circulation patterns. The polar vortex moves southward over Greenland and weakens, to be replaced by an upper high which has developed over Eastern Asia and moved northward. This change is accompanied by rapid temperature rises in the polar stratosphere. The whole phenomenon seems to resemble quite closely the commonly observed stratospheric warmings. (Author abstract)

54438 **APTIC NO. 78581**

Pendergast, M. M. and T. V. Crawford

ACTUAL STANDARD DEVIATIONS OF VERTICAL AND HORIZONTAL WIND DIRECTION COMPARED TO ESTIMATES FROM OTHER MEASUREMENTS. *Preprint, DuPont (E.I.) de Numours and Co., Aiken, S. C., Savannah River Lab., 21p., 1974. 7 refs. (Presented at the Atmospheric Diffusion and Air Pollution Symposium, Santa Barbara, Calif., 1974, Paper DP-MS-74-19 Conf.-740922-5.)*

Meterorological data were collected and used to assess the applicability of several techniques to determine the standard deviations of vertical and horizontal wind direction. Their magnitudes are used for the determination of coefficients for the calculation of downwind concentrations of airborne contaminants. Data were obtained of sufficient resolution to permit direct calculation of the standard deviations at seven levels between 10 and 304 m. Results are presented of analyses of data collected during two periods, one of 2 wk and one of 6 mo. Frequency distributions calculated by the different methods vary greatly. The variations are particularly evident at high cumulative probabilities but also occur at low probabilities. Large variations occur as a result of the choice of layers over which vertical temperature measurements are obtained. (Author abstract modified)

54439 **APTIC NO. 78547**

Pollack, James B. and Owen B. Toon

A STUDY OF THE EFFECT OF STRATOSPHERIC AEROSOLS PRODUCED BY SST EMISSIONS ON THE ALBEDO AND CLIMATE OF THE EARTH. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 457-460, 11 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

Fleets of aircraft, flying at stratospheric altitudes, could lead to a significant increase in the aerosol content of the stratosphere. Exact, multiple-scattering calculations have been carried out to determine the response of the earth s albedo to an increase of the stratospheric aerosol optical depth. A tripling of the aerosol content of the stratosphere, which represents an extreme upper limit to the effects of aircraft flying in the stratosphere, results in a 0.6% increase of the earth s reflectivity and a decrease of the mean surface temperature on the order of 0.3 K. Such changes could be marginally significant. (Author abstract)

54440 **APTIC NO. 78544**

Rao-Vupputuri, R. K.

A ZONALLY AVERAGED CIRCULATION MODEL OF THE STRATOSPHERE INCORPORATING RADIATIVE HEATING AND OZONE PHOTOCHEMISTRY IN A OXYGEN-HYDROGEN-NITROGEN ATMOSPHERE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 390-402, 27 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Ozone, hydrogen oxides, and nitrogen oxides are not only interdependent among themselves; they are coupled to the radiative and transport properties of the stratosphere. It is appropriate to solve the continuity equations for O3, HOx, N2O, and NOx simultaneously in a transport model. A zonally averaged model of the stratosphere, incorporating the interactions among O3, HOx, N2O, NOx, temperature, and the mean circulation, was developed under steady state assumptions. The model was an extension of the two dimensional steady state model developed previously for the photochemical scheme of an oxygen-only atmosphere. Using the classical photochemical scheme along with new rate coefficients, the first experiment showed that the computed distribution of ozone was quite unrealistic as compared to the observations. However, by incorporating the additional reactions involving hydrogen and nitrogen compounds, a satisfactory agreement was achieved between the computed ozone distribution and the observations. The meridional distributions of HOx (hydroxide and water), N2O, NOx (nitric oxide, nitrogen dioxide, and nitric acid), temperature, and the mean circulation were also derived for the summer and winter seasons. They are in general agreement with the available observations. Sensitivity tests show that a 100% increase in the mixing ratio of water vapor reduces total ozone by only 2 to 4%, with highest percentage changes occurring in the high-latitude summer. A 100% increase in the NOx source strength reduces total ozone by 10 to 16%, with the greatest percentage changes again taking place in the high-latitude summer. (Author abstract)

54441 **APTIC NO. 78519**

Reiter, Elmar R.

THE WINTERTIME MEAN MERIDIONAL CIRCULATION IN THE STRATOSPHERE OF THE SOUTHERN HEMISPHERE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 79-82, 7 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The environmental impact of pollutants released by a fleet of supersonic transports will depend strongly on the prevailing flow patterns in the stratosphere. The stratospheric circulations in the northern and southern hemispheres behave differently. A two-cell pattern exists in the northern hemisphere with rising motions in the tropics and in the polar regions, and sinking motions in middle latitudes. The southern hemisphere has a three-cell pattern with a sinking motion over the pole probably caused by the katabatic outflow of cold air near the earths surface along the slopes of the Antarctic highlands. Investigations of a planetary wave pattern and a comparison period in the southern hemisphere winter are reported. The mean meridional circulation of the stratosphere depends strongly on the amplitude of planetary waves, which are highly efficient in transporting heat, ozone, and so on from low to high latitudes. The cyclone waves of middle latitudes fulfill an important function in large-scale horizontal and vertical mixing, but apparently do not effect the rapid transfer of trace constituents from low to polar latitudes during late winter and spring in the northern hemisphere. Planetary wave activity is sometimes suppressed even in the northern hemisphere for extended periods. Large scale transport processes and small scale turbulence and diffusion processes undergo significant variations in their magnitudes over relatively short time periods.

54442 **APTIC NO. 78528**

Ridley, B. A., H. I. Schiff, A. Shaw, and L. R. Megill

IN-SITU MEASUREMENTS OF NO IN THE STRATOSPHERE USING CHEMILUMINESCENCE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess.*

Conf., 3rd, Cambridge, Mass., 1974, p. 193-196, 3 refs. (Feb. 26-March 1.)

NTIS, DDC: AD A003846

In situ measurements were made of the nitric oxide mixing ratios in the stratosphere in balloon flights over the altitude range 17 to 30 km. Because previous similar experiments yielded unexpected results, tests were made for contamination and sampling errors. The absence of any detectable differences among the results obtained during ascent, float, and descent indicated that no major contamination was being encountered from outgassing or absorption from the balloon or payload. An ozonesonde was mounted next to the sampling side of the NO instrument to check for contamination of incoming air by exhaust ozone used to produce chemiluminescence. No unexpected changes in the ozone profile occurred when the NO instrument was turned on or off. The possibility was considered that the NO content of the sampled air was reduced by passage through the 2.6 m inlet tube, either by absorption on the inner aluminum surface of the tube or by heterogeneous reactions between the ambient NO and O3 on the surface. Laboratory experiments under similar pressure, temperature, and NO and O3 concentrations showed differences of less than 10% when 0.2 ppbv of NO was introduced at the front and at the back end of the inlet tube. Results are also reported for measurements taken in the 50 to 60 kft range on two airplane flights. The results of both types of measurement are consistent. (Author abstract modified)

54443 **APTIC NO. 78557**

Russell, Philip B., William Viezee, and Richard D. Hake, Jr.

COMPARATIVE LIDAR/AIRCRAFT MEASUREMENT OF STRATOSPHERIC AEROSOLS. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 303-309, 16 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Results are presented from a comparative experiment including aircraft sampling and lidar observations of stratospheric particulates. Good agreement between aircraft- and lidar- inferred ambient aerosol mass concentration was obtained by modeling the sampled particles as spherical droplets of aqueous sulfuric acid solution with a specific gravity of 1.5, a real refractive index of 1.41, and the Deirmendjian Haze H size distribution. The particle composition, specific gravity, and refractive index adopted are consistent with a laboratory analysis of the aircraft-collected filter sample and the estimated ambient relative humidity. The size distribution adopted is consistent with several previous measurements. The sensitivity to assumed particle acidity (and thus to estimated ambient humidity) of the lidar and aircraft particulate mass values is explored, showing that the two measurements agree for any assumed H2SO4 mass fraction between 40% and 94%. Lidar observations were converted with a model H2SO4 mass fraction of 60% to a time series of stratospheric particulate optical depths for the period October 1972 through September 1973. The resulting values are approximately an order of magnitude smaller than model values obtained by searchlight measurements in 1964 and 1965, when there was a large volcanic contribution to the stratospheric aerosol. (Author abstract modified)

54444 **APTIC NO. 78531**

Schiff, H. I. and B. A. Ridley

ADDITIONAL MEASUREMENTS OF NO. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p.216. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Preliminary nitric oxide measurements near the tropopause are reported. They were obtained with a chemiluminescence instrument on board an airplane. Two flights were made between San Francisco and Honolulu and two from Honolulu northward for 900 mi in January and February of 1974. Some 600 min of measurement were recorded including 266 min at 40 to 41 kft, 281 min at 33-35 kft, and 57 min at 29 kft. The NO mixing ratios was found to vary with location and altitude, and from day to day. The mixing ratios, in general, are low. The mixing ratios at 33 to 35 kft are higher than those at 29 or 40 to 41 kft for the same location and day. There is considerable patchiness for the same altitude and day; mixing ratios at different locations can vary by a factor of six or more. The mixing ratio also varies from day to day at the same location and altitude. It may or may not be significant that the maximum values at 35 kft during the San Francisco to Honolulu flight on January 31 and the maximum values at 41 kft during the return trip on February 4 occurred at the same location, between 135 and 140 deg west, 35 deg north. (Author abstract modified)

54445 **APTIC NO. 78524**

Sellers, Bach and Frederick A. Hanser

UV FLUX LEVEL AND OZONE OVERBURDERN FROM LATITUDES 60 DEG N TO 60 DEG S. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 129-136, 10 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

One of the potential effects of the operation of a worldwide supersonic transport fleet is change in the ultraviolet flux level due to modification of the earths high altitude ozone layer. A spectrophotometer was used to measure the solar flux in the 200 to 400 nm region. Comparison of measured flux values with those computed for an ozone-free atmosphere allows the ozone overburden to be calculated. Ultraviolet flux and ozone overburden results are most accurate at high altitudes, where the response to Rayleigh-scattered light is small compared to the response to direct sunlight. Measurements are reported from flights between 5 deg north and 69 deg north at 40 to 60 kft altitude. Flux measurements show the obvious dependence on solar elevation angle, and the cutoff below 300 to 320 nm. A measurable flux was observed at 210 + or -10 nm altitudes above 50 kft and for high solar elevation angles. The 210 nm flux was 1 to 2 times 10 to the -9 power W/(sq cm-nm), for altitudes near 60 kft and the sun near the zenith, when the ozone overburden (above 60 kft) was about 0.2 cm standard temperature and pressure. Ozone overburdens calculated from the UV flux measurements are consistent with ground based measurements when account is taken of the higher altitude. (Author abstract modified)

54446 **APTIC NO. 78550**

Venkateswaran, S. V.

ULTRAVIOLET RADIATION REACHING THE EARTH S SURFACE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 428-436, 11 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

Engine effluents from a fleet of aircraft regularly flying in the stratosphere might deplete the amount of ozone in the atmosphere, and consequently increase the ultraviolet radiation reaching the earth s surface. To estimate the magnitude of this increase, the influence of various factors governing the radiation field is determined by solving the appropriate radiative-transfer equation. The factors considered include depletion of stratospheric ozone, solar flux incident at the top of the atmosphere, the obliquity of solar illumination, scattering by air molecules, scattering and absorption by aerosols and clouds, and planetary reflection. A decrease of ozone by 20% at middle latitudes might increase the radiative flux at the biologically effective wavelength of 305.5 nm by as much as 30% for an overhead sun, and between 50% and 60% for medium solar elevation. Increased stratospheric turbidity is not expected to mask this effect to a noticeable extent. (Author abstract modified)

54447 APTIC NO. 78562

Whitten, R. C., W. J. Borucki, and R. P. Turco

ONE-DIMENSIONAL-MODEL STUDIES OF OZONE DEPLETION. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 342-358, 31 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

The advantages and limitations of one dimensional models are discussed. Although they usually provide correct order-of-magnitude estimates of minor-constituent concentrations, neglecting horizontal transport by eddies and by circulation is a serious limitation. One dimensional models are useful as an aid in making the development of multidimensional models more tractable. Several techniques for numerically solving the coupled set of reaction equations for mass and momentum conservation are discussed. Photoabsorption in the Schumann-Runge bands is treated from the standpoint of models that are simple enough to be run rapidly on a digital computer. The photochemistry of the various constituents is then studied. In a series of studies involving the simulated emission of nitric oxide by a supersonic transport fleet operating over the North Atlantic, the degree of ozone-column destruction depended on flight altitude. Ozone depletion is less for flight altitudes below 20 km. (Author abstract modified)

54448 APTIC NO. 78563

Wofsy, Steven C.

ATMOSPHERIC PHOTOCHEMISTRY OF N-, H-, AND CL-CONTAINING RADICALS. *Dept. of Transportation, Washington, D. C., Climat. Impact.Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 359-375, 72 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

Sources of atmospheric odd nitrogen and hydrogen are reviewed and their role in ozone photochemistry is discussed. A model, containing few adjustable parameters, gives good agreement with observed distributions of stratospheric and mesopheric ozone. Nitric oxide emitted by aircraft flying in the stratosphere would lead to a significant reduction in the concentration of atmospheric ozone if the globally averaged source of NO exceeded 2 times 10 to the 7th power molecules/sq cm sec. Sources of atmospheric chlorine are discussed. The dominant form of atmospheric chlorine should be hydrochloric acid, which is produced mainly from aerosols of marine origin. The role of chlorine compounds as a catalyst for recombination of odd oxygen is discussed and shown to be unimportant in the normal atmosphere. An appendix discusses the importance of odd-oxygen production below 28 km, where chemical time constants are long. Chemistry below 28 km does not strongly influence nitrogen oxides- ozone interaction models, but may affect model results for chlorine oxides-ozone interaction. (Author abstract)

1973

54449 APTIC NO. 78586

Andersson, R., B. Bergstrom, and B. Bucht

OUTDOOR SAMPLING OF AIRBORNE BACTERIA; RESULTS AND EXPERIENCES. *Aerobiol. Airborne Transm. Airborne Infect. Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 58-62. 7 refs.*

The results of outdoor sampling for airborne bacteria along the Swedish eastcoast are presented. The total bacterial content of rural air varies regularly according to the season, reaching the highest concentrations during the summer and autumn. Diurnal variation appears to be largely dependent on wind and humidity as well as on local disseminating activity. Thus, in coastal regions, the shift to onshore wind during atmospheric inversion correlates well with reduced bacterial numbers. Bacteria which are captured at the 1.5-meter level seem to be mostly of local origin based on particle size distribution studies. Airborne bacteria counts in urban areas are considerably higher than those obtained in rural areas. The highest bacterial counts obtained reach a maximum of 7000 organisms/cu m. Long-distance transport of bacteria also appears to occur based on trajectory analysis studies.

54450 APTIC NO. 78588

Aubert, M. and J. Aubert

TRANSFER OF MICROORGANISMS BY MARINE AEROSOLS. *Aerobiol. Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 66-68. 4 refs.*

The transfer of microorganisms by marine aerosols was studied using large volume samplers on land and at sea and an experimental basin supplied with seawater. The number and size of the marine aerosol particles decreased with increasing distances from the water plane. Fresh water particles were transported for greater distances than were sea water particles. Bacteria transport also decreased with increasing distance from the water plane. Counts of marine bacteria were generally two to three times less than those for terrestrial bacteria. Marine bacteria were observed in aerosol samples collected at altitudes ranging from sea level to 70 m. (Author summary modified)

54451 APTIC NO. 78504

Crews, W. Brian

STATIC AND DYNAMIC TRANSPORT MODELS OF LEAD AND DDT. *Comput. Simulation Conf. Proc., Montreal, Quebec, 1973, p. 535-548. 36 refs. (July 17-19.)*

Static and dynamic transport models of lead and the insecticide dichlorodiphenyltrichloroethane (DDT) are presented. An urban aerosol model which is a simplification of a mass continuity equation is applied to actual lead data for San Diego, Los Angeles, and Oakland. Projections indicate that a total reduction of lead in gasoline to 0.5 g/gal may not be sufficient to meet the California Air Resources Board limit of 1.5 g/cu m over a 30-day average. A Northern Hemispheric model which consists of lead transport and production estimates indicates that the most significant contaminating source of lead in the ecosphere is the burning of leaded gasolines. A DDT model resulting from the modification of a model hypothesized by Woodwell, Craig, and Johnson is expanded to include both terrestrial and marine biota. The model suggests that the DDT concentration in marine and terrestrial biota may lag production changes by 14 and 12 yr, respectively.

54452 APTIC NO. 78497

Hogan, C. Michael, Leda C. Patmore, Harry Seidman, and Clive N. Steward

DISPERSAL OF AIR POLLUTANTS NEAR ROADWAYS. *Comput. Simulation Conf. Proc., Montreal, Quebec, 1973, p. 552-560. 12 refs. (July 17-19.)*

A dispersion model for predicting concentrations of air pollutants generated from roadway sources is described. The basic dispersion model is derived from a Gaussian point source model in which a non-reactive pollutant is assumed to be emitted continuously at a certain distance above an impervious non-absorbing ground plane at a constant rate. The mean relative concentration in any plane perpendicular to the mean wind is obtained by the superposition of two two-dimensional Gaussian distributions. Validation data are presented for carbon monoxide, nitrogen oxides, and particulates. Agreement between model predictions and experimental data is good except for particulates. The poor agreement in the latter case is due to the fact that motor vehicle emissions account for only a small portion of the local particulate levels. A computerized version of the model is applied to the prediction of 1980 concentrations of CO, NOx, hydrocarbons, and particulates as they disperse from a proposed interstate highway.

54453 **APTIC NO. 78578**

Odabasi, Halis

ATMOSPHERIC PROBLEMS, AIR POLLUTION -- A COMPREHENSIVE REVIEW. *Preprint, Colorado Univ., Boulder, Joint Inst. for Lab. Astrophysics, p. 57-110, 1973. 143 refs.*

Carbon monoxide, sulfur dioxide, sulfur monoxide, nitrogen dioxide, and nitric oxide are important in the photochemistry of air pollution. Aerosols provide nuclei for condensation and freezing and influence temperatue by absorbing and scattering solar radiation. Trends, with aerosols of special interest, and methods of reducing emission of man-made aerosols are discussed. Ozone is generated by photochemical reactions among other pollutants, in addition to the trace amount of natural ozone. Ozone is a very important oxidant in the photochemical cycles involving many pollutants. The stratospheric ozone layer is vital because it filters out harmful ultraviolet radiation. Combustion of sulfur containing fuels produces SO2 and traces of sulfur trioxide, the principal atmospheric sulfur oxides. Although the average tropospheric SO2 concentration is around 0.2 ppb, SO2 concentrations in industrial areas and large cities where soff coal is burned for space heating are 10 to the 3rd power to 10 to the 4th power times greater. Carbon monoxide results from incomplete combustion of fossil fuels. Carbon dioxide is taken as a pollutant only because of its greenhouse effect. Anthropogenic nitric oxide comes from combustion, including automobiles. The conversion of NO to NO2 in polluted air is very fast, and the mechanisms are not exactly known. Photochemical smog results from a reaction between certain hydrocarbons, NO, and NO2 under the influence of sunlight. Theoretical reaction mechanisms include the atomic oxygen mechanism, the excited molecular oxygen mechanism, the hydroxyl, perhydroxyl, and atomic hydrogen mechanism and the lead bromochloride and atomic chlorine mechanism.

54454 **APTIC NO. 78614**

Tsunoda, Yoshihiro and Taisuke Satsutani

OBSERVATION OF ATMOSPHERIC IONS AND ATMOSPHERIC PHENOMENA IN KOBE AREA. *Mem. Fac. Eng. Kobe Univ., no. 19:27-37, March 1973. 3 refs.*

The ion density spectra and weather conditions were continuously measured in the Kobe area. Two coaxial type ion counters were used for the observation of ion spectra: one to monitor continuously negative minor ions and the other to observe alternately ions in four mobility ranges. Color photography was used to check the range of vision. The ion densities change considerably. An inverse correlation exists between the density of smaller ions and that of total ions. The density of minor ions is generally high when the relative humidity is low and the range of vision is large.

1967

54455 **APTIC NO. 78481**

Heino, Raino

DIURNAL VARIATIONS IN TEMPERATURE AND WHAT AFFECTS THEM. *(Lampotilan vuorokausivaihtelusta ja siihen vaikuttavista tekijoista). Text in Finnish. Finnish Meteorological Institute, Study Rept. 46, p. 1-45, 1967.*

NTIS: N74-22276.

On the average, under all circumstances, all of the following effects were observed. Daily changes were not greatest during the summer when radiation and daytime temperatures were highest, but in the spring, when, due to light cloudiness and longer nights, the night temperatures were particularly low. The lowest temperature occurred in all seasons approximately at sunrise, earlier in the winter and later in the spring. The highest temperature occurred in the winter at 2 pm and in the summer at 3 pm. Warming up was strongest about 4 hr after sunrise and cooling was strongest slightly after sunset, due to the diurnal changes in cloudiness. Sequential diurnal variation in the spring was generally 80% of the absolute diurnal variation. The radiation factors determined the diurnal variations in temperature, whereas in winter, due to the strong effect of advective factors and slight diurnal variation of the radiation balance, the corresponding figure was closer to 0%. The greatest diurnal variations were in the 30-39 C range when advective factors had an effect, and in the 20-30 C range when radiation factors were influential, depending on topographical details and the quality of the base. In large population centers, daytime temperatures are, on the average, 0.5 C and nighttime temperatures 1.0-1.5 C higher than in the surrounding areas. Cloudiness had a leveling effect on the diurnal variations in temperature. At different times of the day, cloudiness had the greatest effect in raising night temperatures during winter nights and lowering day temperatures on summer days. Wind had a levelling effect in all seasons and in all cloudiness conditions. Even though the wetness of base and snow cover mainly affected on the temperature of the ground, the effect is still noticeable at a height of 2 m. Because of the land-ocean wind phenomenon, the maximum temperatures on the coast occur right after noon, when land wind changes to ocean wind.

BASIC SCIENCE AND TECHNOLOGY

1975

54456 **APTIC NO. 78476**

Bickelhaupt, Roy E.

VOLUME RESISTIVITY-FLY ASH COMPOSITION RELATIONSHIP. *Environ. Sci. Technol., 9(4):336-342, April 1975. 13 refs.*

Research was undertaken to establish a relationship between electrical resistivity and chemical composition for fly ash. Commercially produced ashes having a wide variation in chemical composition were used. The ashes were characterized and made into sintered disk specimens for resistivity and chemical transference experiments. Characterization revealed that the ashes were principally spherically shaped, glassy particles. The results confirmed that volume conduction was controlled by an ionic mechanism in which the alkali metal ions, mainly sodium, served as charge carriers. Experimental data show an inverse proportionality between resistivity and iron concentration for a given level of lithium and sodium. Chemical transference and other ancillary experiments suggested that the presence of iron influenced the number of alkali metal ions capable of migration. Relationships were established between resistivity and specimen porosity, temperature, lithium-sodium concentration, and iron concentration. These relationships were combined to given an expression with which one can predict volume resistivity for one level of field strength. (Author abstract modified)

54457 **APTIC NO. 78417**

Boulaud, D., G. Madelaine, D. Vigla, and J. Bricard

SO2 TRANSFORMATION IN CONTROLLED ATMOSPHERE LEADING TO THE PRODUCTION OF AEROSOL PARTICLES. *Water, Air, Soil Pollut., 4(3/4):435-445, July/Aug. 1975. 11 refs.*

The photochemical transformation of sulfur dioxide and the generation of aerosol particles was investigated in a variety of controlled atmospheres. They are atmospheres with and without initial aerosols, in clean and polluted air, and with various pollutants such as ozone, nitric oxide, nitrogen dioxide, and water vapor in a variety of combinations. Aerosol particle production in large only with the combination of SO2, NO2, and water. (Author abstract modified)

54458 **APTIC NO. 78820**

Cadle, Richard D., Paul Crutzen, and Dieter Ehhalt

HETEROGENEOUS CHEMICAL REACTIONS IN THE STRATOSPHERE. *J. Geophys. Res., 80(24):3381-3385, Aug. 20, 1975. 10 refs.*

Four heterogeneous reactions were added to a one-dimensional dynamic chemical model of the stratosphere. The heterogeneous reactions are the decomposition of ozone, the recombination of atomic oxygen, the reaction of nitrogen pentoxide with the liquid water dissolved in sulfuric acid particles, and the oxidation of sulfur dioxide by hydrogen peroxide sorbed by the particles. Each of these reactions plays an important role in tropospheric chemistry. The need for experimental determinations at stratospheric temperatures of the fraction of collisions between reactive atoms or molecules and impure sulfuric acid particles that result in chemical reactions is emphasized. (Author abstract modified)

54459 **APTIC NO. 78737**

Cooper, William A. and Charles A. Knight

HETEROGENEOUS NUCLEATION BY SMALL LIQUID PARTICLES. *J. Aerosol Sci., 6(3/4):213-221, 1975. 17 refs.*

Classical nucleation theory is used to calculate the nucleating ability of small liquid particles. The deformation of the liquid particle as an embryo grows on it has a pronounced effect on its nucleating ability. Applications to water condensation, sublimation, and freezing are presented and compared with similar results for solid nuclei. The liquid nucleus predictions are more easily tested than the corresponding predictions for solid nuclei, and the advantages of studying liquid experimentally are emphasized. (Author abstract modified)

54460 **APTIC NO. 78904**

Cvetanovic, R. J., R. P. Overend, and G. Paraskevopoulos

ACCURACY AND PRECISION OF GAS PHASE KINETICS TECHNIQUES. *Intern. J. Chem. Kinet., vol. 1975:249-271, 1975. 28 refs. (Presented at the Symposium on Chemical Kinetics Data for the Upper and Lower Atmosphere, Warrenton, Va., Sept. 15-18, 1974.)*

The potential accuracy, precision, and propagation of errors in determinations of gas phase chemical kinetics data are discussed. Methods of treatment of rate data and of the evaluation of the Arrhenius parameters by the least square technique are summarized. The experimental techniques for the determination of the gas phase elementary reactions are classified and their likely sources of error are discussed. For an assessment of the mechanisms of the chemical processes in polluted stratosphere and urban atmosphere the requirements for accuracy vary significantly from reaction to reaction and may be assessed in terms of a particular model by sensitivity tests in computer simulations. The reliability of kinetic data for some of the key atmospheric reactions now substantially exceeds the reliability requirements of atmospheric modeling. (Author abstract modified)

54461 **APTIC NO. 78725**

Daijo, Yashuhiro and Takeshi Saito

GAS SAMPLING FROM COMBUSTION CHAMBER USING INTERMITTENT INJECTION DEVICE AND SOLENOID OPERATED VALVE: THE NO FORMATION IN DIRECT INJECTION DIESEL ENGINE. *(Kanketsu funsha sochi to denjiben ni yoru nenshoshitsunai gasu saishu no kokoromi: Chokusetsu funsha dizeru kikan no NO seisei ni tsuite). Text in Japanese. Preprint, the Japanese Society of Mechanical Engineers, Tokyo, p. 215-218, 1975. 2 refs. (Presented at the Japanese Society of Mechanical Engineers, Lecture Meeting, Sendai, Japan, Oct. 11-12, 1975.)*

The formation process of nitric oxide in a direct-injection diesel engine was investigated by analyzing the combustion gas, sampled directly using an intermittent injection device and solenoid operated valve. The correlation of these data with the emission level yields information for theoretical calculations related to NO control measures. In the ignition period, an excess air ratio of less than 1.0 was detected; however the NO formation in this region was slight. In the subsequent combustion process, both rarefied and concentrated regions were found. The NO formation rate in the former was higher while that in the latter was lower. Delaying of ingition timing allowed combustion to proceed in the concentrated condition, with reduction of the NO formation rate. An increase in injection quantity also reduced the NO formation rate for combustion in the concentrated condition.

54462 **APTIC NO. 78628**

Daubendiek, Richard L. and Jack G. Calvert

A STUDY OF THE N2O5-SO2-O3 REACTION SYSTEM. *Environ. Letters, 8(2):103-115, 1975. 7 refs.*

The rates of chemical changes in gaseous nitric anhydride-sulfur dioxide and N2O5-SO2-ozone mixtures were studied using infrared spectroscopy. Sulfur trioxide was not a detectable product of these reaction systems, and no significant SO2 removal occurred. Calculated rate constants for the reaction of nitrogen trioxide with sulfur dioxide to produce nitrogen dioxide and SO3 and the reaction of N2O5 with SO2 to produce nitrogen tetroxide and SO3 suggested that neither reaction is an important removal path for SO2 in sunlight irradiated, nitrogen oxide-hydrocarbon polluted atmospheres. Determinations of the near ultraviolet absorption spectrum of pure N2O5 and estimates of the actinic irradiance revealed that the rate of photochemical decomposition of N2O5 by the absorption of solar light in urban atmospheres is an unimportant factor among the reactions which establish the N2O5 and NO3 concentrations. Gaseous SO2 and NO2 were observed to react rapidly to form a relatively nonvolatile white solid, with preliminary data suggesting a 1:1 mole ratio for this adduct. The significance, if any, of this adduct and related compounds in urban aerosol formation awaits evaluation.

54463 **APTIC NO. 78895**

Davies, C. N.

VISUAL RANGE AND SIZE OF ATMOSPHERIC PARTICLES. *J. Aerosol Sci., 6(5):335-347, 1975. 20 refs.*

The influence of particle size on visual range in the atmosphere is examined. The product of visual range and mass concentration of an aerosol is constant for a given particle size distribution. When the distribution is broken down into a set of size ranges, the contribution of each size range is additive with respect to the reciprocal of the visual range. The use of cascade impactors to sample mists appears to be ineffective for catching droplets with radii below 0.5 micron which may signficantly contribute to visual range reduction. Aitken nuclei may also be present with mist droplets. The fact that calculated visual ranges are sometimes lower than measured visual ranges can be accounted for by the failure to include the effect of fine droplets and particles in the calculations.

54464 **APTIC NO. 78839**

Glaenzer, K. and J. Troe

HO2 FORMATION IN SHOCK HEATED HNO3-NO2 MIXTURES. *Ber. Bunsenges. Physik. Chem., 79(5):465-469, May 1975. 18 refs.*

Nitric acid was pyrolyzed in shock waves in the presence of nitrogen dioxide. The formation of HO2 in the reaction in which hydroxyl ion + NO2 yields HO2 + nitric oxide was monitored by ultraviolet absorption. A rate constant, (4.5 + or - 1) times 10 to the 12th power cu cm per mole per sec, of the reverse reaction was derived in the temperature range 1350 K to 1700 K. (Author abstract)

54465 **APTIC NO. 78909**

Glasson, William A.

EFFECT OF CARBON MONOXIDE ON ATMOSPHERIC PHOTOOXIDATION OF NITRIC OXIDE--HYDROCARBON MIXTURES. *Environ. Sci. Technol., 9(4):343-347, April 1975. 18 refs.*

The effect of carbon monoxide concentrations up to 424 ppm on the photooxidation of an ethylene-nitric oxide mixture was studied in a long path infrared cell. The nitrogen dioxide rate, ozone rate, and O3 yield increases with CO concentration, while ethylene oxidation is unaffected. The effect of CO on the photooxidation of mixtures of NO with various hydrocarbons was studied. Of the six hydrocarbons studied, CO has effects in the presence of ethylene, isooctane, and mesitylene. The effect of CO concentration of the photooxidation of a simulated atmospheric hydrocarbon was studied and shows that the effect of CO at about 35 ppm on photochemical smog formation is minimal. (Author abstract modified)

54466 **APTIC NO. 78916**

Gorski, C. H. and L. E. Stettler

THE ADSORPTION OF WATER AND BENZENE ON AMOSITE AND CHRYSOTILE ASBESTOS. *Am. Ind. Hyg. Assoc. J., 36(4):292-298, April 1975. 16 refs.*

The adsorption of water and benzene on amosite and chrysotile asbestos was investigated. Benzene adsorption is extremely slow on both adsorbents with each point taking from 4-24 hr for equilibration. The larger benzene molecule has a more difficult time working its way through the small pores. The water isotherm on both asbestos minerals is typical Type II which shows that physical adsorption is predominant. In both cases hysteresis is found. Benzene adsorption on amosite resembles Type IV which reflects capillary condensation phenomena. With chrysotile some chemisorption occurs. The BET surface areas and heats of adsorption are calculated. (Author abstract modified)

54467 **APTIC NO. 78613**

Harman, J. N., III

ELECTROCHEMICAL GENERATION OF POLLUTANT STANDARDS. *Preprint, American Society for Testing and Materials, Philadelphia, Pa., 28p., 1975. 12 refs. (Presented at the Calibration -- Problems and Techniques Symposium, Boulder, Colo., Aug. 5-7, 1975.)*

The electrochemical generation of the pollutant species by a coulometric process is a potential means of generating synthetic pollutant standards for the calibration of air quality monitoring instruments. Ozone, nitric oxide, chlorine, carbon monoxide, sulfur dioxide, and hydrogen sulfide were electrolytically generated at the ppb to ppm level in a scrubbed ambient air carrier. Theoretical background and practical aspects of this technique are discussed and the difference in pollutant output to that expected theoretically is reviewed. The theoretical yield, which must be obtained for this generation technique to be used as a primary calibration technique, was not achieved. As a result, this technique does not appear feasible as a primary technique for the production of these species. However, the approach may serve as a convenient, low cost means to produce secondary or working standards for the calibration of ambient level air pollution analyzers. (Author abstract modified)

54468 **APTIC NO. 78777**

Hester, Norman E., Edgar R. Stephens, and O. Clifton Taylor

FLUOROCARBON AIR POLLUTANTS II. *Atmos. Environ., 9(6/7):603-606, June/July 1975. 11 refs.*

The atmospheric measurement and fate of fluorocarbon air pollutants were investigated. Instrumentation was developed to detect dichlorodifluoromethane (FC 12) at levels of 10 times 10 to the -12th power cu cm/cu cm of air and trichlorofluoromethane (FC 11) at levels of 1 times 10 to the -12th power cu cm/cu cm of air, on a routine basis. These concentrations are well below typical levels of background unpolluted air. Irradiation of FC 11, 12, dichlorotetrafluoroethane (FC 114), and trichlorotrifluoroethane (FC 113) in ambient Riverside air, simulated heavy smog, and simulated heavy smog plus sulfur oxides indicate that these compounds are photochemically very stable, and show no measurable tendency to decompose. Fluorocarbons 11 and 12 provide a good label for following the movements of polluted air inland from Los Angeles. (Author abstract modified)

54469 **APTIC NO. 78962**

Hill, F. M.

A NUMERICAL STUDY OF THE DESCENT OF A VORTEX PAIR IN A STABLY STRATIFIED ATMOSPHERE. *J. Fluid Mech. (Cambridge), vol. 71:1-13, Sept. 9, 1975. 6 refs.*

Numerical methods are used to investigate the motion of a horizontal vortex pair through a stably stratified atmosphere. The trailing vortices formed behind an aircraft carry with them a mass of fluid whose density differs from that of the air through which it descends, and the surface of this accompanying fluid becomes a vortex sheet, which is modelled by a set of discrete line vortices. An account is given of how the equations governing the motion were written in a form accessible to numerical analysis. A check on the method of integration is described. The vortex pair slows down at first with the shape of the envelope of the accompanying fluid remaining constant. Later, vorticity concentrates at the rear, initiating detrainment and causing a downward acceleration of the vortex pair. The vortices approach each other throughout the motion. (Author abstract modified)

54470 **APTIC NO. 78668**

Hui, Kin-Kwok, David I. Rosen, and Terrill A. Cool

INTERMODE ENERGY TRANSFER IN VIBRATIONALLY EXCITED O3. *Chem. Phys. Letters (Amsterdam), 32(1):141-143, April 1, 1975. 7 refs.*

A laser excited fluorescence method was used to determine the rate constants for vibrational relaxation of the ozone (010), O3(100), and O3(001) levels at 298 K. The fluorescence observations for the O3(010) level provide direct measurements of the rate for intermode vibrational energy transfer from the coupled v1 and v3 modes to the ve mode. The slowness of this process indicates the likelihood that the v1 and/or v3 modes (rather than the v2 mode) play a predominant role in the laser enhanced reaction between O3 and nitric oxide at 298 K. (Author abstract modified)

54471 **APTIC NO. 78499**

Jeffries, Harvey E., Donald L. Fox, Richard Kamens, and Lyman A. Ripperton

DESIGN AND OPERATION OF A DUAL OUTDOOR SMOG CHAMBER. *Preprint, North Carolina Univ., Chapel Hill, Dept. of Environmental Sciences and Engineering and Research Triangle Inst., Research Triangle Park, N. C., 37p., 1975. 22 refs.*

A dual-compartment, outdoor smog chamber (312 cu m in size) is described along with some experimental data obtained with the device. The chamber is designed to use natural sunlight, temperature, and relative humidity as well as natural North Carolina rural background air to more closely simulate ambient air conditions. The facility uses a computer-based data acquisition and control system to fully automate 12-hour experimental runs. A comparison of data obtained during a dual run of the chamber with propylene and nitrogen oxides on one side and a simulated hydrocarbon mix and NOx on the other side with data from an indoor smog chamber using a propylene and NOx mixture reveals faster rates of reaction for the indoor chamber. The hydrocarbon/NOx ratio in the indoor chamber is approximately equal to 4 as compared with a value of 8 for the outdoor chamber. The primary factor responsible for the faster reaction rates observed with the indoor chamber is the noonday light intensity present in the indoor simulation. (Author abstract modified)

54472 APTIC NO. 78408

Kamimoto, Takemasa, Makoto Matsuoka, Yuzo Aoyagi, and Yukio Matsui

STUDIES ON THE COMBUSTION OF DIRECT-INJECTION DIESEL ENGINE. *(Chokusetsu funsha-shiki dizeru kikan no nensho ni kansuru kenkyu). Text in Japanese. Preprint, the Japanese Society of Mechanical Engineers, Tokyo, p. 219-222, 1975. 3 refs. (Presented at the Japanese Society of Mechanical Engineers Lecture Meeting, Sendai, Japan, Oct. 11-12, 1975.)*

Combustion and soot formation mechanisms in a direct-injection diesel engine were experimentally investigated using a four cycle direct-injection diesel engine with bore size 95 mm, stroke 110 mm, and compression ratio 15.0. During the period of diffuse combustion, more air is supplied to the flame than is consumed, and the unused air accumulates. At the later part of the combustion period, the rate of air supply is reduced, and the combustion proceeds with a part of the accumulated air. The amount of unused fuel vapor in the flame and the air supply rate and two factors that most closely correlated with the combustion rate. In diesel combustion, the dispersion process by turbulent flow of fuel vapor from the flame center to the outer region of the flame is presumed to be rate determining. The exhaust smoke density is determined by the average excess air ratio in the flame in the latter period of diffuse combustion, regardless of the operating conditions. Therefore, the main governing factor in the soot formation process in diesel engines is the average excess air ratio in the flame.

54473 APTIC NO. 78500

Katzer, James R.

KINETICS OF NO REDUCTION BY NH3 OVER SUPPORTED PT AND THE EFFECT OF SO2. *Preprint, Delaware Univ., Newark, Dept. of Chemical Engineering, 75p., 1975 (?). 60 refs.*

Studies of the kinetics of the catalytic reduction of nitric oxide by ammonia over supported platinum were performed in a steady-state flow microreactor. The rate of reaction was satisfactorily described by a single-site Langmuir-Hinshelwood kinetic model involving associative NO adsorption and dissociative NH3 adsorption. The reaction between adsorbed NO and an adsorbed nitrogen fragment appeared to be rate limiting. Oxygen markedly enhanced the reaction rate. The rate of NO reduction by NH3 was markedly reduced by very low concentrations of sulfur dioxide, with catalyst activity being much more decreased for ruthenium as opposed to platinum, palladium, or nickel catalysts. Oxygen also enhanced the rate of NO reduction in the presence of SO2. Hydrogen sulfide and SO2 appeared to form different compounds upon reacting with Pt, Pd, and Ni; the susceptibility of attack was greatest with Ni and least with Pt. (Author abstract modified)

54474 APTIC NO. 78894

Kops, J., G. Dibbets, L. Hermans, and J. F. Van de Vate

THE AERODYNAMIC DIAMETER OF BRANCHED CHAIN-LIKE AGGREGATES. *J. Aerosol Sci., 6(5):329-333, 1975. 9 refs.*

The aerodynamic diameter of branched chain-like aggregates of iron oxide and gold particles was studied using a centrifugal aerosol spectrometer. The aerosols, which were radioactively labeled, were produced by an exploding wire. The size distribution of the primary particles of the aggregates was determined by means of electron microscopy with negative stained catalase crystals serving as an internal length standard. A relationship between the aerodynamic diameter and the number of primary particles of the aggregates was obtained. The relationship was divisible into two regions for which there was a correlation with linear and cluster aggregates of monodisperse polystyrene spheres. The aerodynamic diameter was proportional to the sixth root of the number of primary particles for one of the regions, while for the other region it was proportional to the cube root of the number of primary particles. (Author abstract modified)

54475 APTIC NO. 78570

Ku, R., N. A. Gjostein, and H. P. Bonzel

CHEMISORPTION AND REACTIVITY OF NO ON THE CRYSTAL FACE (10 BAR 10) RU. *Preprint, Ford Motor Company, Dearborn, Mich., Scientific Research Staff, 19p., 1975. 12 refs.*

A combination of modern surface measurement techniques such as low energy electron diffraction, Auger electron spectroscopy, and thermal desorption spectroscopy were used to study the chemisorptive behavior of nitric oxide on the (1010) ruthenium surface. The experimental evidence strongly favors an adsorption model in which NO adsorbs and rapidly dissociates in separate nitrogen and oxygen adsorbed phases, each exhibiting ordered structures. The nitrogen phase begins to desorb at temperatures as low as 200 C, and continuous exposure to NO in this temperature range results in an increasing oxygen coverage until the surface is saturated with oxygen and no further NO dissociation can take place. There is evidence that once the surface is saturated with the dissociated NO phase further NO adsorption occurs in a molecular state. The nitrogen desorption spectrum depends strongly on coverage and exhibits several peaks which are related to structure of the adsorbed phase. The implications of the results with respect to the catalytic reduction of NO by hydrogen and carbon monoxide and the N2-selectivity of Ru catalysts are discussed. (Author abstract)

54476 APTIC NO. 78443

Kulic, E., E. Rhodes, and G. Sullivan

HEAT TRANSFER RATE PREDICTIONS IN CONDENSATION ON DROPLETS FROM AIR-STEAM MIXTURES. *Can. J. Chem. Eng., vol. 53:252-258, June 1975. 31 refs.*

The combined heat and mass transfer to single water droplets falling freely in mixtures of steam and air are simulated. The effects of droplet size, initial velocity, and concentration of steam in the mixture are discussed. Theories and correlations of combined heat and mass transfer are used to predict the temperature responses of spheres and droplets falling in the mixtures. The internal resistance to heat transfer is predicted to considerably affect the temperature response of the larger droplets in the more concentrated steam mixtures. Initial droplet velocity has a strong effect on the temperature response of a small droplet. The greater the injection velocity, the faster the temperature response. The predicted heat transfer coefficients are compared with literature values. (Author abstract modified)

54477 APTIC NO. 78630

Law, S. Edward and Henry D. Bowen

THEORETICALLY PREDICTED INTERACTIONS OF SURFACE CHARGE AND EVAPORATION ON AIRBORNE PESTICIDE DROPLETS. *Trans. ASAE (Am. Soc. Agr. Engrs.), 18(1):35-39 and 45, Jan.-Feb. 1975. 19 refs.*

A theoretical analysis of interactions between the surface charge of airborne pesticide droplets and their evaporation is presented. A free-body analysis of an evaporating charged droplet at static equilibrium is developed to determine the critical droplet charge-to-mass ratio which theoretically causes the onset of hydrodynamic instability and subsequent surface rupture. During the electrostatic precipitation of airborne pesticides, surface rupture can be a serious charge-loss phenomenon and can introduce undesirable satellite droplets of smaller diameter and greater drift potential.

54478 **APTIC NO. 78945**

Lindinger, W., D. L. Albritton, Carleton J. Howard, F. C. Fehsenfeld, and E. E. Ferguson

LABORATORY MEASUREMENTS OF H2O2+ PRODUCTION AND LOSS REACTIONS AND IMPLICATIONS FOR MESOSPHERIC H2O2. ***J. Geophys. Res., 80(22):3277-3279, Aug. 1, 1975. 14 refs.***

Rate constants were measured as a function of kinetic energy for exothermic reactions of H2O2+ with nitric oxide (k1), water (k2), and oxygen+ (k3). The rate constants are all large at 300 k and are insensitive to relative kinetic energy up to approximately 1 eV. The reaction with O2+ is the dominant source of H2O2+ in the D region and the reaction with water is the dominant loss. The near equality of k2 and k3 implies that the steady state ratio of (concentration H2O2+)/(concentration O2+) is approximately equal to (concentration H2O2)/(concentration H2O). The ratio (concentration of H2O2)/(concentration of H2O) in current model atmospheres is very much less than the reported 34+/32+ ion concentrations ratios in the D region. (Author abstract modified)

54479 **APTIC NO. 78741**

Liu, Benjamin Y. H. and David Y. H. Pui

ON THE PERFORMANCE OF THE ELECTRICAL AEROSOL ANALYZER. ***J. Aerosol Sci., 6(3/4):249-264, 1975. 9 refs.***

The electrical aerosol analyzer was studied using monodisperse aerosols. The aerosols were generated by an electrostatic classification principle and by the photochemical conversion of gaseous sulfur dioxide into sulfuric acid droplets. The measuring range of the instrument is from 0.006 to 1.0 micron in particle diameter and the sensitivity varies from 0.01 to 4000 pA/(10 to the 6th power particles/cu cm) over the range of the instrument. Data are presented showing the performance of the device as a function of particle size and as a function of the operating conditions of the diffusion charger. (Author abstract modified)

54480 **APTIC NO. 78643**

Mangia, Alessandro

DETERMINATION OF ALPHA-QUARTZ IN ATMOSPHERIC DUST: A COMPARISON BETWEEN INFRARED SPECTOMETRY AND X-RAY DIFFRACTION TECHNIQUES. ***Anal. Chem., 47(6):927-929, May 1975. 8 refs.***

Infrared spectrometry and X-ray diffraction techniques are compared in the determination of alpha-quartz in atmospheric dust. Pellets with 0.735, 1.472, and 1.917% of dust were prepared. Both the potassium bromide and the membrane technique are used, but in the second procedure, to improve the sensitivity of the method and to reduce the effects of the inhomogeneity, the samples are transferred from the original membrane to another one, on a surface of the same shape and dimensions as the spectrophotometric entrance port. X-ray diffraction on the same samples of dust is used to check the two procedures. The infrared method, even if it is not as specific as the X-ray diffraction, is suitable in determining even small quantities of quartz, especially using the membrane support technique. The KBr technique gives valuable information about the mean size of the particles.

54481 **APTIC NO. 78822**

McKnight, Lee G. and Eoin W. Gray

INTERACTIONS OF ATMOSPHERIC POSITIVE IONS WITH ORGANIC CONTAMINANTS. ***Int. J. Mass Spectrom. Ion Phys., 17(4):353-370, Aug. 1975. 12 refs.***

The chemistry of ions produced in relay arcs, and from a glow discharge, was examined in a drift tube mass spectrometer apparatus using air and air-like mixtures (of oxygen, nitrogen, and water) with organic materials. Positive ions from a relay arc afterglow and from a glow discharge react with trace constituents and are converted into aromatic organic ions and their clusters. There is no sign of reaction in the presence of small amounts of methane and simple halocarbons. The ion chemistry is controlled by charge exchange, proton transfer, and clustering mechanisms. (Author abstract modified)

54482 **APTIC NO. 78656**

Miles, Gaines E., E. Dale Threadgill, Joe F. Thompson, and Robert E. Williamson

SIMULATION OF DROPLET DEPOSITION ON BODIES WITH RECTANGULAR BOUNDARIES. ***Trans. ASAE (Am. Soc. Agr. Engrs.), 18(1):74-78, Jan.-Feb. 1975. 10 refs.***

Results from computerized simulations of droplet deposition on bodies with rectangular boundaries are presented. A computer model of spray droplet deposition formulated by Miles is used for simulation. Direct deposition on fixed, vertical surfaces for a constant Reynolds number and Froude number increases as droplet size increases up to a point and then decreases with increasing droplet diameter. For horizontal targets, however, no decrease in deposition efficiency with increasing droplet diameter is predicted for droplet diameters up to 300 micron and for air velocities as large as 15 ft/sec. Simulation of droplet deposition on a target 30 deg from horizontal indicates that deposition efficiency generally increases as droplet size increases to an optimal value and then decreases for an increase in particle diameter. Ultra-low-volume (10-300 micron) droplets at wind velocities and target sizes commonly found in agricultural spraying operations appear to have deposition efficiencies ranging from near zero to about 100%.

54483 **APTIC NO. 78739**

Nair, P. V. N. and K. G. Nohra

GROWTH OF AQUEOUS SULPHURIC ACID DROPLETS AS A FUNCTION OF RELATIVE HUMIDITY. ***J. Aerosol Sci., 6(3/4):265-271, 1975. 21 refs.***

Values of equilibrium sizes and growth curves of aqueous solution droplets of sulfuric acid of initial dry size in the range of 10-5000 A were computed. Data are for relative humidities of 1, 10, 30, 50, 70, 80, 90, 100, 101, and 110% and for acid activities of 10 to the -13 power, 10 to the -10 power, 10 to the -7th power, 0.0001, and 0.01. The computations are based on generalized Kelvin equations which incorporate the composition dependence of surface tension and density. The relative increases in size and mass depend on the quantity of solute per particle and the equilibrium solute activity is very small for particles of radii above 50 A for relative humidities above 50%. The possibility of a hysteresis in the experimental growth curves, the threshold activity for nucleation, the growth of particles of mixed composition, and the growth of Aitken nuclei to cloud nuclei are discussed. (Author abstract modified)

54484 **APTIC NO. 78740**

Nguyen, X. and J. M. Beeckmans

SINGLE FIBRE CAPTURE EFFICIENCES OF AEROSOL PARTICLES IN REAL AND MODEL FILTERS IN THE INERTIAL-INTERCEPTIVE DOMAIN. ***J. Aerosol Sci., 6(3/4):205-212, 1975. 16 refs.***

The efficiences of a fibrous filter and of two model filters were determined using monodisperse aerosol particles in the size range of 0.95-1.75 micron, at various velocities. An empirical relation is proposed to correlate these data and other (previous) data on the domain of the Stokes number, the Reynolds number, the interception parameter, and the packing density. The proposed equation combines the four principal dimensionless variables which are known to have an effect on single fibre efficiency, in a convenient analytical form, in which the predicted single fibre impaction efficiency cannot exceed unity. (Author abstract modified)

54485 **APTIC NO. 78879**

Nojima, Kazuhiro, Katsuhisa Fukaya, Shozo Fukui, and Saburo Kanno

STUDIES ON PHOTOCHEMISTRY OF AROMATIC HYDROCARBONS II. THE FORMATION OF NITROPHENOLS AND NITROBENZENE BY THE PHOTOCHEMICAL REACTION OF BENZENE IN THE PRESENCE OF NITROGEN MONOXIDE. *Chemosphere, 4(2):77-82, April 1975. 2 refs.*

The photochemical reaction of benzene in the presence of nitric oxide is described. Benzene and nitric oxide were injected into a quartz reaction vessel and irradiated with a xenon lamp, causing a solid to be deposited in the vessel. The solid was dissolved in methanol. The solution was subjected to thin-layer chromatography, gas chromatography, and gas chromatography-mass spectrometry. The solid was composed of substituted compounds of benzene such as nitrobenzene, o-nitrophenol, p-nitrophenol, 2,4-dinitrophenol, and 2,6-dinitrophenol. These substances cause headache, breathing difficulties, vomiting, rise in body temperature, and numbness in extremities which are characteristic symptoms of seriously stricken victims of photochemical smog in Japan.

54486 **APTIC NO. 78800**

Rasch, R.

BONDING OF SULPHUR DIOXIDE IN THE WASTE GASES OF COMBUSTION INSTALLATIONS. *(Uber die Bindung von Schwefeldioxide in den Abgasen von Verbrennungsanlagen). Text in German. Aufbereitungs-Technik, 16(5):237-240, May 1975. 11 refs.*

The structure-chemical processes taking place during the bonding of sulfur dioxide in combustion equipment-generated flue gases are described. The dry adsorption of SO2 on solid surfaces, especially of activated carbon, requires the presence of an atomic oxygen layer upon which SO2 is bound. The oxygen necessary for bonding in wet absorption process, i.e., with neutral water, is provided by hydroxyl ions. Therefore, the efficiency of wet absorptive bonding is a function of the pH value. Washing with neutral water has consequently low efficiency. Dry and wet absorption result in ionic compounds; sulfate or sulfite ions with cations such as sodium, potassium, calcium, magnesium, iron manganese, or vanadium. Dry hot absorption yields sulfate, while wet absorption yields sulfites as primary products, and sulfates as secondary products. The optimal temperature range for dry absorption of SO2 lies between 400 and 550 C. Gamma ferric oxide and maghemite are best for the absorption of SO2, while alpha-ferric oxide and hematite are less reactive. Wet absorption with alkaline solution is most efficient when hydroxides with low solubility are used, which form sulfites that can be separated easily due to their increased solubility.

54487 **APTIC NO. 78409**

Sugimoto, Takayochi, Kenzo Hosoi, Hiromi Ogata, Jyo Shaku-Ko, and Eikichi Kin

EFFECT OF ATMOSPHERIC HUMIDITY ON THE NITRIC OXIDE FORMATION IN GASOLINE ENGINE. *(Jidoshayo gasorin kikan no NO ni oyobosu taiki shitsudo no eikyo ni kansuru kenkyu). Text in Japanese. Preprint, the Japanese Society of Mechanical Engineers, Tokyo, p. 275-278. 4 refs. (Presented at the Japanese Society of Mechanical Engineers Lecture Meeting, Sendai, Japan, Oct. 11-12, 1975.)*

Factors governing nitric oxide formation are oxygen and nitrogen concentrations and combustion temperature. The NO emission from an internal combustion engine varies with specific factors such as combustion chamber characteristics, compression ratio and valve timing, variable factors such as ignition timing, air-fuel ratio, engine speed, and load, and atmospheric factors such as humidity, pressure and temperature. The effect of humidity is particularly marked, and the automotive exhaust emission test results are corrected to the standard condition using a correction coefficient. Experimental results concerning the effect of humidity on NO concentration indicated that NO concentration decreased approximately linearly with the increase in humidity, and its gradient varied with intake negative pressure and air-fuel ratio. The effect of load and ignition timing were also investigated. At a constant engine speed and torque, effects of humidity on driving conditions (air-fuel ratio, intake negative pressure, ignition timing) were investigated.

54488 **APTIC NO. 78701**

Zung, Joseph T.

SURFACE AND GAS-PHASE RESISTANCES TO THE EVAPORATION OF DROPLETS. *Environ. Letters, 8(4):283-296, 1975. 9 refs.*

The magnitudes of both the gas phase resistance and the surface resistance to the evaporation of droplets were assessed and the transition plant at which the evaporation changes from a diffusion-controlled to a surface-controlled process was determined. This transition plant is strongly dependent upon the ambient pressure and the droplet size. At atmospheric pressure the particle radius at which the transition takes place is in the range of 1-10 micron for water, 0.1 micron for n-dibutylphthalate, 0.1 to 1.0 micron for mercury, and 0.001 micron for liquid helium. The surface resistance and the gas phase resistance vary with the size of the droplet in opposite direction, leading to the existence of a maximum rate of evaporation at a certain value of the droplet radius. This radius is dependent upon the characteristics of the liquid concerned. (Author abstract modified)

1974

54489 **APTIC NO. 78536**

Barnes, John L.

CIAP PREDICTION UNCERTAINTIES. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 573-574. 2 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Two major recommendations are made with regard to predictions for the years 1990 to 2000 and beyond on the effects of stratospheric flights on climate. First, a distribution of results should be predicted, rather than a single numerical estimate. There might be only two points from which the distribution function is inferred, or a third might be added by including a mean or median value. Second, if only a few experimental data points have been obtained, the methods of distribution-free statistics should be employed to derive conclusions. Such an approach is especially appropriate with a small data set, where the usually ignored assumptions necessary for use of the relations in classical statistics severely strain the bounds of knowledge. (Author abstract modified)

54490 **APTIC NO. 78689**

Devitofrancesco, Giuseppe, Arnaldo Liberti, Bianca Maria Petronio, and Corrado Conte

INTERACTION BETWEEN SULPHUR DIOXIDE AND ATMOSPHERIC PARTICULAR MATTER. *Annu. Chim. (Rome), 64(1-2):27-33, 1974. 14 refs.*

The interaction between sulfur dioxide and atmospheric particulate matter was investigated. The equilibrium concentration of sulfur and sulfate of dust kept in closed vessels with air containing SO2(100-300 ppm) was measured in different experimental conditions. Radiations affect very strongly the chemisorption of SO2. In the absence of radiation there is adsorption of SO2 on the dust which is promptly oxidized to sulfate. The increase of S content corresponds stoichiometrically to the increase of sulfates, the humidity increasing to some extent the rate of the oxidation reaction. (Author abstract modified)

54491 **APTIC NO. 78792**

Higashino, Ichiro and Tomohiro Nomura

AN ANALYSIS OF THE COMBUSTION IN A CYLINDER BY MEANS OF THE INDICATOR DIAGRAM PATTERN. *Mem. Fac. Eng., Osaka City Univ., vol. 15:19-26, Dec. 1974. 6 refs.*

The shapes of the indicator diagram of engine cylinder combustion were classified into four patterns and representative performances of these patterns in a cylinder were examined. The rectangular coordinate system O-PT (T as the X coordinate axis, P as the Y coordinate axis, and the CTDC as the origin and the 15 determining elements) is used to determine the shape of the pattern. The representative performances are different from one element to another. Variables with major influence are ignition timing and air-fuel ratio. (Author abstract modified)

54492 **APTIC NO. 78506**

Hubley, John H., John R. Mitton, and John F. Wilkinson

THE OXIDATION OF CARBON MONOXIDE BY METHANE-OXIDIZING BACTERIA. *Arch. Mikrobiol., vol. 95:365-368, Feb. 13, 1974. 11 refs.*

Carbon monoxide was observed to induce both respiration and carbon dioxide production in washed cell suspensions of the methane-oxidizing bacteria Methylomonas albus and Methylosinus trichosporium. Tracer techniques indicated that the CO was oxidized by suspensions of the two methylobacteria as opposed to merely stimulating endogenous CO2 production. Typical rates of respiration following CO addition to the cell suspensions were between 6 and 8 nanomoles oxygen/min/mg dry weight cells as compared with endogenous respiration rates of between 2 and 3 nanomoles O2/min/mg dry weight cells. Rates of CO2 production were doubled in the presence of CO to give values on the order of 5 nanomoles CO2/min/mg dry weight cells.

54493 **APTIC NO. 78649**

Ivanov, A. P., B. A. Kargin, S. V. Kuznetsov, and A. L. Skrelin

LASER PROBING OF THE UPPER LAYERS OF THE ATMOSPHERE. *Bull. Acad. Sci. (USSR) Phys. Atmos. Oceans (English translation from Russian of: Izv. Akad. Nauk. SSSR, Fiz. Atmosfery i Okeana), 10(8):530-534, Aug. 1974. 16 refs.*

A Monte Carlo calculation of the laser radiation that is scattered backwards by the upper layers of an inhomogeneous atmosphere is performed. Results are presented for a cloudless atmosphere with different degrees of pollution and for different experimental geometries. A scattering order of greater than two does not appear to exist for most situations. Estimates of the signal/noise ratio for viewing distant objects are also calculated. (Author abstract modified)

54494 **APTIC NO. 78439**

Kanamaru, K. and T. Daito

FUEL TYPE AND PROMPT NITRIC OXIDE. *(Nenryoshu to prompt NO). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 127-130, 1974. 26 refs. (Presented at the Japan Society of Mechanical Engineers Combustion Symposium, 12th, Tokyo, Japan, Dec. 5-6, 1974.)*

The temperature dependence of prompt nitric oxide in a methane flame and the formation of prompt NO in ethylene and acetylene adiabatic flames is discussed. The reactions involved include the following: (1) the formation of hydrogen cyanide and nitrogen from CH and diatomic nitrogen; (2) the formation of hydrogen cyanide and an amine radical from CH2 and diatomic nitrogen; (3) the formation of 2 molecules of cyanide from C2 and diatomic nitrogen; and (4) the formation of cyanide and nitrogen from elemental carbon and diatomic nitrogen. Reaction (4) has an optimum effect on acetylene in a high-temperature flame, but in equation (4), the production of elemental carbon is controlled by the production of formaldehyde, and this is negligible in the usual state. In reaction (2), it occupies 30% of the total in methane and ethylene flame and 20-25% in the acetylene flame, and the values are constant. Prompt NO formation depends on the CH radical.

54495 **APTIC NO. 78735**

Khanna, P. and Arvind Kumar

SYSTEMS APPROACH IN ENVIRONMENTAL ENGINEERING. *J. Inst. Engrs. (India) (Calcutta), 55(PH1):8-13, Oct. 1974. 29 refs. (Presented at the Recent Developments in the Field of Public Health Engineering Seminar, Hyderabad, Oct. 21-22, 1973.)*

The systems approach to environmental engineering is discussed and applied to the area of air pollution control. The use of diffusion models to estimate the relationship between pollutant emissions and ambient concentrations in turn allows for the establishment of an air quality constraint set. A model for multiple sources of air pollutants where the degree of emission reduction is taken as the decision variable is described. The model is basically a linear programming problem where the objective is to minimize the total cost of implementing an air quality standard subject to the air quality constraint set. Another model which includes reliability parameters as design decision variables in air pollution control systems is also described. The model also incorporates the expected concentrations of pollutants due to planned maintenance and breakdown of control devices.

54496 **APTIC NO. 78944**

Nizohata, Akira, Tadao Matsunami, and Tetsuo Mamuro

STUDY ON THE ELEMENTAL COMPOSITION OF AEROSOL PARTICLES IN RELATION TO THEIR SIZE. *Annu. Rep. Radiat. Cent. Osaka Prefect., vol. 15:1-9, 1974. 3 refs.*

Instrumental neutron activation analysis was applied to size separated aerosol samples collected by an Andersen air sampler, and 32 elements were determined. These analytical data were treated by numerical analysis and the cumulative frequency and the size distribution were determined for each element. The elements are classified into three groups according to the positions of occurrence of the peak values in the size distribution curve. For the elements selenium, arsenic, cadmium, and antimony only one peak appears in a size range below 1 micron. For the elements aluminum, calcium, scandium, titantium, lanthanum, cerium, samarium, ytterbium, lutetium, hafnium, tantalum, and thorium only one peak appears at about 3 micron. For the elements sodium, chlorine, potassium, vanadium, chromium, manganese, iron, cobalt, zinc, bromine, rubidium, silver, cesium, barium, and tungsten two peaks appear both in a range below 1 micron and at about 3 micron.

54497 **APTIC NO. 78896**

Morelli, Jacque, Patrick Buat-Menard, and Roger Chesselet

EXPERIMENTAL AEROSOL GENERATION AT THE SURFACE OF THE SEA. *(Production experimentale d aerosols a la surface de la mer). Text in French. J. Rech. Atmospheriques, 8(3 and 4): 961-986, July-Dec. 1974. 45 refs. (Presented at the International Symposium on the Chemistry of Sea-Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

The production of seawater aerosols in a closed container immersed open-face down into the sea was investigated. Air bubbles were formed by passing ultra-filtered air through two fritted glass diffusers immersed 10 cm below the sea surface. The aerosol which was formed as these bubbles burst at the surface was collected by filtration in the upper portion of the enclosure. The mass concentration of the aerosols produced for high bubble production rates showed a reduction of about one order of magnitude when oleic acid was added at the water interface. This result appeared to be due to the surface tension properties of the fatty acid which lowered the quantity of energy involved in the bursting of a bubble of given size. An enrichment of potassium relative to the potassium/sodium weight ratio of bulk seawater was observed in the collected aerosols and appeared to be related to the properties of the natural organic film. A similar enrichment was observed without the addition of oleic acid due to the enrichment occurring in the film drop particles. Since these particles were derived from the top part of the sea surface microlayer, it appeared that the potassium enrichment was governed by specific properties of organic components such as glycoproteins which accumulate preferentially at the top of the microlayer.

54498 **APTIC NO. 78440**

Otsuka, Y. and J. Hama

A STUDY ON THE PRODUCTION OF POLLUTANTS BY RAPID JET STREAM, (1). PRODUCTION OF CARBON MONOXIDE AND HYDROCARBONS IN AN OPEN FLAME. *(Kosoku funryuen ni okeru osenbusshitsu seiseikatei no kenkyu, Dai-ippo Kaihoen ni okeru CO, HC no seiseikatei). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 143-146, 1974. 3 refs. (Presented at the Japan Society of Mechanical Engineers Combustion Symposium, 12th, Tokyo, Dec. 5-6, 1974.)*

A study of the characteristics of turbulent flow flame and production of carbon/monoxide and hydrocarbons by measurements of temperature and concentration of the open turbulent flow flame formed from the flame protector on the nozzle. Protected flame and burning flame conditions, measurements of flame temperature measurements of the concentrations of CO and (HC), and the production process of CO and HC are discussed. The relationship between the mixing ratio of propane and air and the critical flow velocity of CO and was studied. The critical flow velocity could be caused by changes in the burning mechanism in the flame brush and could be related to CO exhaust directly. The critical flow velocity in the diluted side could be parallel to the cube of the burning velocity.

54499 **APTIC NO. 78865**

Putzger, Gertraut

EXPERIMENTAL THEORETICAL INVESTIGATIONS CONCERNING AIRFLOW THROUGH CLOTH WITH NARROW AND WIDE PORES - PARTICULARLY THROUGH FILTER CLOTH. *(Experimentell-theoretische Untersuchungen zur Luftstroemung durch eng- und weitporinge Gewebe - insbesondere Filtergewebe). Text in German. Wiss. Z. Tech. Univ., Dresden, 23(3/4):725-730, 1974. 17 refs.*

Known theories and relationships for the mathematical characterization of air flow through porous bodies as well as fiber and cloth filters were revised on the basis of comprehensive experimental results. The experimental theoretical investigations show that Kozeny s equation is universally valid for cloths with small pores only. In the case of cloths with large pores, the parameter determined by the quotient of air permeability and pressure difference is dependent on the velocity, which is considered in Landt s and Rainard s equations.

54500 **APTIC NO. 78537**

Schainker, Robert B.

CLIMATIC IMPACT ASSESSMENT PROGRAM: ERROR-VARIANCE ANALYSIS. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 575-581. 10 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Several types of uncertainties, including systematic and random measurement errors and modeling uncertainties, are discussed. Propagation of uncertainties through cascades of mathematical models is also considered. Three statistical tools, statistical trend and confidence-interval analysis, statistical correlation of two variables, and tests of goodness-of-fit between measurement data and model predictions, are summarized. They specify the use of the results from a planned monitoring program focusing upon climatic and biologic indices that may be perturbed by stratospheric vehicle effluents, and consequently help in the design of the program.

54501 **APTIC NO. 78760**

Seibel, Dennis R. and F. P. McCandless

SEPARATION OF SULFUR DIOXIDE AND NITROGEN BY PERMEATION THROUGH A SULFOLANE PLASTICIZED VINYLIDENE FLUORIDE FILM. *Ind. Eng. Chem. Process Design Develop., 13(1):76-78, Jan. 1974. 5 refs.*

The separation of sulfur dioxide and nitrogen by permeation through a sulfolane plasticized vinylidene fluoride film was investigated. The membrane is effective for the separation of SO2 from a binary mixture with nitrogen. Depending on permeator conditions, actual separation factors varying from about 30 to 100 and fluxes varying from 0.02 to 1.86 scfd/sq ft are observed for the optimum membrane composition containing about 8.2 wt% sulfolane. Feed gas pressures of 100 to 500 psig were investigated. The membrane selectivity is high dependent on feed and membrane composition, and on permeator pressure. (Author abstract modified)

54502 **APTIC NO. 78525**

Simon, P.

BALLOON MEASUREMENTS OF SOLAR FLUXES BETWEEN 1960 A AND 2300 A. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 137-142, 16 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Data on solar radiation in the 1960 to 2300 A wavelength range have been obtained by means of a balloon-borne spectrometer. Ultraviolet spectra for different zenith angles were recorded with an equivalent slit width of 6 A. Extrapolation to zero air mass leads to extraterrestrial solar fluxes lower than the values measured previously. The present results give an apparent blackbody temperature of the sun on the order of 4700 K at 2000 A. (Author abstract)

54503 **APTIC NO. 78452**

Yokochi, Akira

STUDIES ON STANDARD AEROSOL GENERATION I. *(Hyojun earozoru no hasseiho ni kansuru kenkyu I). Text in Japanese. Tokai Daigaku Kiyo (Proc. Fac. Eng. Tokai Univ.), no. 2:43-47, 1974.*

Sodium chloride aerosol of submicron range was produced by use of a modified two-step furnace generator consisting of boiler, reheater, and dilution system. The size of the produced particles depends strongly on the temperature of both furnaces and also the amount of carrier and dilution gases. The temperature of the second furnace should be 50 C higher than that of the first furnace, and for better homogeneity of particle size, the dilution gas should be introduced in between the first and the second furnace. By adjustment of the amount of dilution gas, the size of the particles can be controlled between 0.1 and 0.5 micron.

1973

54504 **APTIC NO. 78412**

Heschel, W. and T. Wuntschoff

FLOW RESISTANCE OF PACKINGS OF NEEDLE-AND FIBER-SHAPED PARTICLES. *Stroemungswiderstand von Schuettungen aus nadel- und faserfoermigen Partikeln.*

Text in German. Freiberger Forschungsh A., no. (519):109-124, 1973. 16 refs.

Pressure loss measurements were carried out on bulk material consisting of needle-shaped and fibrous particles. The flow resistance of fine particles was measured with water, and that of coarse particles with air as a flow medium. The bulk material was assumed to contain parallel passages of constant cross-section. Grain size alone as a characteristic value was found not to be sufficient for the description of the particle geometry, because it resulted on errors in the preliminary computation of the drag of such bulk materials when applying the relations of Ergun, Krischer or Brauer. In any case, the form factor of the particles must be determined or at least estimated. Without considering the form factor, the pressure loss calculated for xylite 80/30 would be by one order of magnitude lower than the actual value. These errors diminish with increasing value of the form factor.

54505 **APTIC NO. 78615**

Hosono, Masao, Sinji Sugii, Osamu Kusudo, and Waichiro Tsujii

SIMULTANEOUS ESTIMATION OF PARTICLE SIZE, RELATIVE REFRACTIVE INDEX AND CONCENTRATION OF LATTICES BY TURBIDITY MEASUREMENTS. *Bull. Inst. Chem. Res., Kyoto Univ., 51(2):104-117, 1973. 14 refs.*

A mathematical method for simultaneously estimating the particle size, concentration of particles in a lattice, and the relative refractive index of the lattice is presented. The calculations are based on turbidity ratio measurements made at three or more different wavelengths. Values obtained for polystyrene latex by the method are presented and show close agreement with those obtained by other methods. The method is applicable to measurements of monodisperse particles; its validity for polydisperse systems is not yet established.

54506 **APTIC NO. 78515**

Zerull, R.

MICROWAVE ANALOG STUDIES ON SCATTERING PROPERTIES OF DUST PARTICLES. *(Mikrowellenanalogieexperimente zur Lichtstreuung an Staubpartikeln). Text in German. Federal Ministry of Research and Technology, Germany, Div. Extraterrestrial Physics, Ruhr Univ., Bochum, Germany, Rept. W 73-18, Nov. 1973, 96p. 58 refs.*

NTIS: N 74 21038

The scattering properties of nonspherical particles were studied in microwave analog experiments by multiplying the wavelength of light and the particle size by a factor 10,000. The wavelength used for the microwave analog experiments was 8 mm, and a reflex klystron was used as a transmitter. Experiments with rough spheres showed that surface roughness, accounting for about 10% of the wavelength, has no significant influence on the scattering behavior of such spheres, indicating the applicability of the Mie theory. Zodiacal light model experiments with small cubes showed good agreement with an equivalent sphere mixture, and, in contrast with the latter, a predominantly positive polarization. Isotropic scattering at 0-40 deg and more neutral polarization predominance of negative values were found for large cubes. Regarding intensity, octahedrons assumed an intermediate position between spheres and cubes, and they behaved as cubes regarding polorization.

1972

54507 **APTIC NO. 78805**

Sema, T., K. Hoshizawa and Y. Ishihara

EFFECTS OF NITROGEN IN FUEL OIL ON THE FORMATION OF NITROGEN OXIDES. *(Nenryo chu no chisso bun ga chisso sankabutsu no seisei ni oyobosu eikyo). Text in Japanese. Denryoku chuo kenkyusho gijutsu daiichi kenkyusho honkoku (Tech. Lab. Central Res. Inst. (No.1) Electric Power Ind., Rept.), no. 72025:1-25, Sept. 1972. 14 refs.*

An investigation was conducted to study the effect of nitrogen in fuel oil on the formation of nitrogen oxide. The combustion test was carried out using a single burner test furnace with C oil (N content 0.2 wt%) as fuel. Quinoline manufactured from coal (N content about 10%) was added from 0 to 12 wt% as external nitrogen source. Nitrogen oxides in the combustion gas were determined automatically and continuously by a potentiometric method and were corrected by phenol-disulfonic acid method. Results revealed that the NOx concentration increased proportionally with increasing nitrogen content in the fuel. The rate of increase of the NOx varied with the excess air, the more the excess air, the greater the rate of increase. The NOx concentration increased from 250 ppm at 3% O2 concentration in the combustion gas to 340 ppm at 4% O2 concentration when no quinoline was added. The nitrogen oxides originating from the combustion of the nitrogen compounds in the fuel increased from 34% at O.2 wt% N content to 51% at 0.4 wt% N content.

EFFECTS-HUMAN HEALTH

1975

54508 **APTIC NO. 78873**

Adler, Alan D., Veronika Varadi, and Nancy Wilson

PORPHYRINS, POWER, AND POLLUTION. *Ann. N. Y. Acad. Sci., vol. 244:685-694, April 15, 1975. 37 refs. (Presented at the Biological Role of Porphyrins and Related Structures Conference, Oct. 23-26, 1973.)*

The involvement of porphyrinic materials with pollution processes is discussed. Many of the anion pollutants, such as cyanide and fluoride, and many of the gas pollutants, such as carbon monoxide and the nitrogen oxides, have the central iron of hemeproteins as their primary target. Many forms of heavy metal poisoning arise due to interference of these metals with the roles or biosyntheses of porphyrins. The metalloporphyrins are sensitive simple colorimetric detectors of pollutants as carbon monoxide, nitrogen oxides, cyanides, fluorides, and strong oxidants. Hemeproteins are primary targets for nitrite pollution and iron porphyrins catalyze a number different types of nitrogen oxide interactions that are of significance in areas of pollution and health.

54509 **APTIC NO. 78713**

Allen, B. R., M. R. Moore, and J. A. A. Hunter

LEAD AND THE SKIN. *British J. Dermatol., 92(6):715-719, 1975. 37 refs.*

The increasing use of lead will continue to give rise to problems of toxicity. Protective measures have resulted in florid lead poisoning becoming rare. Attention has recently turned to the possibility of prolonged exposure to low doses of lead causing morbidity in the absence of the classical clinical features of poisoning. Lead is absorbed mostly through the lungs and gastrointestinal tract. Some is also absorbed through the skin but with inorganic compounds the amount is small. Shortly after the most widely used compound, tetraethyl lead, was first manufactured, cases of toxicity began to occur. Manufacture was forbidden until plant design produced greater safety. Significant absorption can occur through the skin. The hazard to those handling leaded gasoline in a normal manner is probably small, mainly because 95% of a dose applied to the open skin surface evaporates. Hair has been used as a biopsy material to assess lead exposure. The biological effects of lead poisoning are discussed, including the synergistic effects of lead and agents provoking porphyria.

54510 **APTIC NO. 78421**

Aviado, Domingo M.

TOXICITY OF AEROSOL PROPELLANTS IN THE RESPIRATORY AND CIRCULATORY SYSTEMS. X. PROPOSED CLASSIFICATION. *Toxicology (Netherlands), vol. 3:321-332, 1975. 13 refs.*

A classification of the 15 propellants used in aerosols is proposed that is based on their acute inhalational toxicity. The most toxic propellant, trichlorofluoromethane, is used as the basis for the comparison of the 14 other propellants. The basic feature of the proposed classification is the separation of the low pressure from the high pressure propellants. The classification is as follows: Class 1, low pressure from the high pressure propellants. The classification is as follows: Class 1, low pressure propellants of high toxicity: trichlorofluoromethane, dichlorofluoromethane, trichlorofluoromethane, trichloroethane, and methylene chloride; Class 2, low-pressure propellants of intermediate toxicity: dichclorotetrafluoroethane, monochlorodifluoroethane, isobutane, and octafluorocyclobutane; Class 3, high pressure propellants of intermediate toxicity: dichlorodifluoromethane, monochlorodifluoromethane, propane, vinyl chloride; and Class 4, high pressure propellants of low toxicity: chloropentafluoroethane and difluoroethane.

54511 **APTIC NO. 78422**

Aviado, Domingo M.

TOXICITY OF AEROSOL PROPELLANTS IN THE RESPIRATORY AND CIRCULATORY SYSTEMS. IX. SUMMARY OF THE MOST TOXIC: TRICHLOROFLUOROMETHANE (FC 11). *Toxicology (Netherlands), vol. 3:311-391, 1975. 18 refs.*

The acute inhalational toxicity of trichlorofluoromethane (FC 11) is summarized. There is a striking similarity in threshold concentrations between the mouse and the rat and between the dog and the monkey. The mouse and rat require lower levels of concentration (1 to 2.5%) to influence the respiratory system, but higher levels (2.5 to 5.0%) to affect the circulatory system. The respiratory systems of the monkey and the dog have about the same sensitivity as those of the other two species in that the threshold level of FC 11 is 2.5 to 5%. The circulatory systems of the monkey and the dog are influenced by a concentration of 0.5%. (Author abstract modified)

54512 **APTIC NO. 78833**

Aviado, Domingo M. and David Gary Smith

TOXICITY OF AEROSOL PROPELLANTS IN THE RESPIRATORY AND CIRCULATORY SYSTEMS. VIII. RESPIRATION AND CIRCULATION IN PRIMATES. *Toxicology (Netherlands), vol. 3:241-252, 1975. 9 refs.*

The toxicity of 15 aerosol propellants in the respiratory and circulatory systems was investigated in monkeys. The low pressure propellants influence predominantly the circulation, whereas the high pressure propellants affect the respiration in anesthetized monkeys. There are four groups according to the level of toxicity: Class 1, low pressure propellants of high toxicity that cause tachycardia and hypotension: trichlorofluoromethane, dichlorofluoromethane, trichlorotrifluoroethane, trichloroethane, and methylene chloride; Class 2 low pressure propellants of intermediate toxicity that influence either circulation or respiration or both: dichlorotetrafluoroethane, monochlorodifluoroethane, isobutane, and octafluorocyclobutane; Class 3 high pressure propellants of intermediate toxicity that cause bronchoconstriction: dichlorodifluoromethane, monochlorodifluoromethane, propane, and vinyl chloride; and Class 4 high pressure propellants of low toxicity that do not influence respiration or circulation even when inhaled at levels of up to 20% concentration: chloropentafluoroethane and difluoroethane. (Author abstract modified)

54513 **APTIC NO. 78765**

Chaipin, Edward S., M. I. Rudnicki, and Howard W. Williams

HAZARDS AND SAFETY ANALYSIS OF VARIOUS POWERESYSTEMS FOR COAL MINE SHUTTLE CARS. *Bureau of Mines Information Circ., vol. 8666: 100-116, 1975. (Presented at the Symposium on the Use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)*

Health hazards in underground mines caused by open cycle diesel powered shuttle cars and their prevention and control are discussed. Carbon monoxide poisoning occurs with no proper warning since the gas is odorless and colorless. An increase in smoke level should warn miners that incomplete burning is taking place and CO level is increasing. A 10% aqueous solution of sodium sulfite, inhibited with 0.5% hydroquinone to prevent rapid oxidation of the sulfite absorbs substantially all the aldehydes and reduces hazards. Catalytic scrubbers reduce toxicants but do not reduce exhaust temperature to permissible levels. They are not acceptable substitutes for exhaust cooling systems required for approved diesel machines in the United States. Preventive maintenance includes removing coal dust, oil, and grease from engine parts on routine basis.

54514 **APTIC NO. 78638**

Cole, P. V.

COMPARATIVE EFFECTS OF ATMOSPHERIC POLLUTION AND CIGARETTE SMOKING ON CARBOXYHAEMOGLOBIN LEVELS IN MAN. *Nature (London), 255(5511):699-701, June 26, 1975. 16 refs.*

The effects of atmospheric pollution and cigarette smoking on carboxyhemoglobin levels in man were investigated in subjects living on the Island of Sark and in two areas of the City of London. The average concentration of CO on Sark is 1 ppm. A total of 78 non-smoking subjects have a mean COHb of 0.68% with a range of 0.2-2.6%. In a hospital outpatient department in the City of London (where smoking is forbidden) the ambient CO concentrations range between 2-4 ppm. The mean COHb level in 120 non-smokers is 0.97% with a range of 0.2-2.5%. In an adjacent office where smoking is permitted, the ambient concentration is slightly higher, 3-8 ppm CO. the COHb levels in 100 office workers (non-smokers) are slightly higher, a mean of 1.12% with a range of 0.1-2.7%. The mean COHb of smokers is 5.5% with a range of 2.2-13.0%.

54515 **APTIC NO. 78795**

Doherty, Robert E. and Domingo M. Aviado

TOXICITY OF AEROSOL PROPELLANTS IN THE RESPIRATORY AND CIRCULATORY SYSTEMS. VI. INFLUENCE OF CARDIAC AND PULMONARY VASCULAR LESIONS IN THE RAT. *Toxicology (Netherlands), vol. 3:213-224, 1975. 7 refs.*

The influence of cardiac and pulmonary vascular lesions in the rat on the proarrhythmic activity of three aerosol propellants was investigated. Trichlorofluoromethane (FC 11) provokes arrhythmia in rats, mice, and monkeys, dichlorodifluoromethane (FC 12) in monkeys and rats, but not in mice, and difluoroethane (FC 152a) only in rats. Inhalation of 10% FC 12 or FC 152a induces abnormalities in the electrocardiogram in rats, in part by causing the release of catecholamines from the adrenal medulla. In the adrenalectomized rats, or in animals pretreated with a beta clocking drug, the appearance of abnormal patterns following inhalation of a 20 or 40% propellant is due to a local action of the fluorocarbon on the heart muscle which is independent of the adrenergic receptors. The FC 11 causes abnormalities in the electrocardiogram by releasing catecholamines from the adrenal medulla and by indirectly and directly stimulating the beta adrenergic receptors in the heart.

54516 **APTIC NO. 78897**

Gross, Stanley B., Emil A. Pfitzer, David W. Yeager, and Robert A. Kehoe

LEAD IN HUMAN TISSUES. *Toxicol. Appl. Pharmacol., 32(3): 638-651, June 1975. 18 refs.*

Lead concentrations in 29 different tissue sections obtained at autopsy from 46 white males living in a typical metropolitan area (Cincinnati) were determined to characterize normal lead tissue levels and to investigate changes in body burden of lead with age. Over 90% of the lead in the body was found in the skeletal tissue. Lead concentrations in calcified tissues increased with age, while in other tissues decreases in lead concentration with age were observed. Some of these decreases were associated with the aging process and pathological changes. Dense bone lead content increased steadily with age, while spongy bone lead leveled off or decreased in later years. The apparent body burden of lead in this population sample was less than that reported by other investigators, with more than 70% of the sample appearing to be in lead balance with their environment. (Author abstract modified)

54517 **APTIC NO. 78893**

Heyder, J., L. Armbruster, J. Gebhart, E. Grein, and W. Stahlhofen

TOTAL DEPOSITION OF AEROSOL PARTICLES IN THE HUMAN RESPIRATORY TRACT FOR NOSE AND MOUTH BREATHING. *J. Aerosol Sci., 6(5): 311-328, 1975. 19 refs.*

The total deposition for nose- and mouth-breathing of monodisperse airborne di-2-ethylhexyl sebacate droplets (0.1-3.2 micron in diameter) was studied in five normal subjects for a variety of breathing patterns without respiratory pauses. Deposition fell with increasing gas volume of the respiratory tract for all subjects and all particle sizes. No individual differences in deposition for mouth-breathing were observed when inhalations were initiated at the subject s normal functional residual capacities. Deposition for nose-breathing was quite different from that for mouth-breathing, with inertial impaction being much more effective. The particle size of minimum deposition fell from 0.48 micron at 250 cu cm tidal volume to 0.38 micron at 2000 cu cm tidal volume at a breathing flow rate of 250 cu cm/sec. In contrast to mouth-breathing, the particle size of minimum deposition was independent of the residence time of particles in the respiratory tract when 1000 cu cm of aerosol was inhaled at different flow rates.

54518 **APTIC NO. 78841**

Jacob, G.

ASBESTOS AS AN ENVIRONMENTAL CARCINOGEN. *(Asbest als Umweltkanzerogen). Text in German. Z. Erkrankungen Atmungsorgane, 142(1):3-17, 1975. 85 refs.*

Relationships between asbestosis, bronchial carcinoma, and diffuse malignant pleural and peritoneal mesothelioma and occupational asbestos exposure have been ascertained. Such relationships can be proved statistically for nonprofessional environmental influence only with malignant serosa tumors. Their increased occurrence parallels calcified hyaline pleural plaques, another occupational and nonprofessional consequence of asbestos dust inhalation. There is not enough evidence to accuse asbestos as a carcinogen causing other malignomas. The number of uncontrolled persons occupationally or nonoccupationally exposed to asbestos is still very high. Nevertheless no increased risk of cancer provoked by asbestos can be supposed for the public at present. Favorable conditions exist for the solution of problems still unsolved in asbestosis control, due to the registration of all persons exposed to asbestos dust and reporting all tumors. (Author abstract modified)

54519 **APTIC NO. 78639**

Jorgensen, Harold S.

MEDICAL VIEWPOINTS ON AIR POLLUTION IN MINES CAUSED BY DIESEL EXHAUST GAS. *Bureau of Mines Information Circ., vol. 8666:220-230, 1975. 6 refs. (Presented at the Symposium on the Use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)*

The effect of air pollution caused by diesel exhaust gas in the iron ore mine in Kiruna, Sweden was investigated in a long term study of 240 mine workers. There is a significant increase in frequency of bronchitis among underground workers compared with surface workers, and more so among smokers. There is an interaction between underground work and smoking. The worker s impression of the air is also influenced by smoking habits. Lung function studies do not reveal any differences among workers and smokers other than those which can be accounted for by differences of age. The diesel problem is closely attached to the dust problem. To prevent any ill effects on health caused by diesels underground it is necessary to direct efforts toward the gas problem as well as the dust problem. (Author summary modified)

54520 **APTIC NO. 78974**

Kerrebijn, K. F., A. R. M. Mourmans, and K. Biersteker

STUDY ON THE RELATIONSHIP OF AIR POLLUTION TO RESPIRATORY DISEASE IN SCHOOLCHILDREN. *Environ. Res., 10(1):14-28, Aug. 1975. 29 refs.*

Respiratory symptoms and ventilatory functions were measured in fourth and fifth grade schoolchildren living in two areas that differ in air pollution but are comparable with respect to social and demographic factors. Children living in the highly polluted area showed a higher prevalence of coughing, which is assumed to be due to the difference in pollution level. Mean ventilatory function in the children from the two areas did not differ. Mean peak expiratory flow rate and forced expiratory volume of children with symptoms were lower than in children without in both areas. Depending on the criteria used, prevalence figures for chronic respiratory disease ranged between 5.3 and 12.7% in the highly polluted and 3.3 and 9.8% in the low polluted area. (Author abstract)

54521 **APTIC NO. 78645**

Kibelstis, John A.

MEDICAL EFFECTS OF DIESELS UNDERGROUND. *Bureau of Mines Information Circ., vol. 8666:159-170, 1975. 23 refs. (Presented at the Symposium on the use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)*

The medical effects of diesel exhaust emissions in underground mines are reviewed. If ventilation is inadequate, carbon dioxide concentrations rise and the pH of the blood drops when its buffering capacity is exceeded. Although the direct effects of elevated CO2 is depressant to the heart muscle, the associated acidosis results in the release of adrenergic substances which increase heart rate, blood pressure, and cardiac output. Decreased oxygen levels cause shortness of breath, mental obtundation, and death. Carbon monoxide impairs the health by its effects upon the oxygen carrying capacity of the blood. In humans, an exposure to 35 ppm CO for 8 hr results in a carboxyhemoglobin (COHb) level of 5%. Many normal people can tolerate 20% COHb levels with little or no change in their physical or mental function. Chronic exposures to 12-17 ppm nitrogen dioxide cause increased connective tissue bundles, emphysema, and increased cell production in rats. At a level of 25 ppm, humans are aware of difficulty in breathing. Deaths occur following acute exposure to high levels of NO2. At low levels of sulfur dioxide, the eyes, nose, and throat of mammals are swollen and inflamed. At exposures of 10 to 20 ppm SO2, mice become significantly more susceptible to viral infection and pneumonia.

54522 APTIC NO. 78444

Langmann, R.

AIR POLLUTION AND DISEASES OF THE RESPIRATORY TRACT. *(Luftverschmutzung und Atemwegerkrankungen). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 37(7):392-395, 1975.*

Investigations of well-known toxic agents and their effects on the respiratory system are discussed. The first assay indicated a threshold value of 1.3 g/sq m in a short-term exposure to dust, and 0.85 g/sq m for a long-term exposure. In the last assay, these values were reduced to 0.65 and 0.35. The threshold values were estimated based on 0.1 mg/cu m for dust below 10 microgram. For sulfur dioxide, a continuous exposure of 0.14 mg/cu m and a short-term exposure of 0.5 mg were judged tolerable. Physicians estimated a maximum limit of tolerance of 0.4 mg.

54523 APTIC NO. 78801

Lunde, R. van der, C. Huygen, E. J. Jansen-Koster, S. Knijpstra, R. Peset, B. F. Visser, E. H. E. Wolfs, and N. G. M. Orie

A TEMPORARY DECREASE IN THE VENTILATORY FUNCTION OF AN URBAN POPULATION DURING AN ACUTE INCREASE IN AIR POLLUTION. *Bull. Physio-Pathol. Respir. (Nancy), 11(1):31-43, Jan.-Feb. 1975. 11 refs.*

Men and women of various age groups were tested for vital capacity (VC) and forced expiratory volume in 1 sec (FEV1) at 3 yr intervals in two localities, one polluted and the other relatively unpolluted. Each set of tests was completed within 5 days. The results in the polluted area were contrary to expectations: the values for VC and FEV1 in the majority of the men and women were higher in the second investigation than in the first investigation. There was an unusually high peak in the air pollution during the days the first measurements were taken, and during the second investigation the pollution data were unusually low. A number of explanations other than short term air pollution differences were considered, but no evidence was found to support them. Persons who showed the greatest decrease in VC or FEV1 had a slightly higher prevalence of chronic, nonspecific lung disease than did those who had a slight or no decrease in VC and FEV1. In studies on long term effects of exposure to air pollution, one must consider the possibility that short term effects may influence the results of the lung function measurements. It is always important, therefore, to include a questionnaire on respiratory symptoms in such studies, since it is unlikely that short periods of air pollution influence the prevalence of chronic respiratory symptoms. (Author abstract modified)

54524 APTIC NO. 78899

Miller, Albert

SCREENING TESTS FOR PULMONARY FUNCTION ABNORMALITY. *Environ. Health Perspect., vol. 11:243-246, June 1975. 9 refs.*

Screening tests for the detection of pulmonary function abnormalities are described. Airway impairment which occurs with sensitization to organic dusts can be detected in the early stages by the use of maximal mid-expiratory flow measurements and the maximum expiratory flow-volume curve at low lung volumes. Volume impairment which occurs with exposure to mineral dusts is conveniently detected by forced vital capacity measurements. All of these tests are easily performed and repeated, require little time, and can be readily set up in the field for occupational screening and other purposes. (Author abstract modified)

54525 APTIC NO. 78978

Miller, Albert

PULMONARY FUNCTION DEFECTS IN NONSMOKING VINYL CHLORIDE WORKERS. *Environ. Health Perspect., vol. 11:247-250, June 1975. 7 refs.*

Pulmonary function was assessed by spirometry and maximum expiratory flow volume curves in 348 workers exposed to vinyl chloride fumes and poly(vinyl chloride) dust in a polymerization plant to determine whether a contaminated occupational environment is associated with an increased risk of respiratory impairment. Data were analyzed for smoking, duration of exposure, and age. The high prevalence of impaired flow (57.5%) could not be attributed to smoking. Prevalence in nonsmokers was 36.4% when exposure was less than 10 yr, 42% when exposure was between 10 and 20 yr, and 80% when exposure exceeded 20 yr. The last is virtually the same rate as for smokers exposed more than 20 yr. The same trend is shown with increasing age. When smokers and nonsmokers older than 40 yr are compared, prevalence rates of air flow impairment are not statistically different. (Author abstract modified)

54526 APTIC NO. 78685

Nagata, I., H. Asami, and H. Otani

SURVEY OF THE EFFECTS OF AUTOEXHAUST ON HEALTH IN THE URBAN AREA IN AICHI PREFECTURE. *(Aichi-ken no toshichiiki ni okeru jodosha haishutsugasu no kenko eikyo chosa). Text in Japanese. Koshu Eisei (J. Public Health), 39(1):60-63, Jan. 1975. 3 refs.*

Medical examinations were performed on 100 non-smoking inhabitants over the age of 20 in Toyohashi and Ichinomiya in September and November 1973 by personal interview, determination of blood pressure and grasping power, examination of lung function and blood, urine, and chest roentgenography. Although some persons complained of respiratory disturbance and showed lung function, the group values for every examination item were in the normal range. Although complaints and symptoms of anemia were found especially in women, lead intoxication was not found in anyone. There was no conspicuous health impairment among persons in either city as compared to the results of 1972 survey.

54527 APTIC NO. 78862

Niazi, Sarfaraz and Win L. Chiou

FLUOROCARBON AEROSOL PROPELLANTS VI: INTERSPECIES DIFFERENCES IN SOLUBILITIES IN BLOOD AND PLASMA AND THEIR POSSIBLE IMPLICATIONS IN TOXICITY STUDIES. *J. Pharm. Sci., 64(9): 1538-1541, Sept. 1975. 35 refs.*

Solubilities of trichloromonofluoromethane, dichlorodifluoromethane, and dichlorotetrafluoroethane were determined in the blood and plasma of humans, monkeys, dogs, rats, and mice. Differences as large as fourfold in blood and more than 33 fold in plasma are found in different species. The partitioning of fluorocarbons between blood cells and plasma show even greater differences between species. In all instances the human plasma shows the highest concentration at equal blood concentrations. These differences are attributable to the differences in the partitioning between blood cells and plasma. This observation has an important bearing on comparative evaluations of toxic blood concentrations in various species if the plasma concentrations correlate better with the possible toxic manifestations. (Author abstract modified)

54528 APTIC NO. 78883

Nolte, D.

IMPORTANCE OF ENVIRONMENTAL FACTORS FOR BRONCHIAL DISEASES. *(Bedeutung von Umweltfaktoren fuer Bronchialerkrankungen). Text in German. Med. Welt (Stuttgart), 26(19):913-916, 1975. 24 refs.*

Problems of the interpretation of findings concerning the role of environmental factors, such as allergens, microorganisms, tobacco smoking, and air pollution in bronchial diseases are discussed. The epidemiological findings in this area are too contradictory to be interpretable. Nonetheless, relationships found between bronchitis morbidity and average sulfur dioxide concentrations over 0.08 ppm and dust concentrations over 150 microgram/cu m suggest correlation between air pollution levels and bronchial diseases. In opposition to other similar investigations, massive lung function investigations in inhabitants of the highly polluted Ruhr area revealed a far greater importance to tobacco smoking than air pollution when compared with findings obtained for inhabitants from non-polluted rural areas. The plethysmographic tests in acutely exposed humans do not allow conclusions on long-term effects. Chronic animal experiments are hard to interpret in human medicine. The process of the development of bronchial disease involves a chain reaction, starting with bronchial-bronchiolar spasm due to bronchial constriction, which may be potentiated by the release of proteolytic enzymes. The second step includes metaplasia of goblet cells as a precondition for chronic infection, with the development of emphysema is initiated or accelerated by cell proliferation in the alveolar region, possibly due to the release of proteolytic enzymes. Further studies and experiments will be necessary to establish positive relationships between air pollution and bronchial diseases.

54529 **APTIC NO. 78780**

Peng, Geoffrey W. and Win L. Chiou

FLUOROCARBON AEROSOL PROPELLANTS VII: INTERACTION STUDIES WITH HUMAN AND BOVINE GLOBULINS USING PARTITION COEFFICIENT METHOD. *J. Pharm. Sci., 64(9):1577-1578, Sept. 1975. 7 refs.*

The interaction of trichloromonofluoromethane, dichlorodifluoromethane, and dichlorotetrafluoroethane with human and bovine globulins was investigated using the partition coefficient method. All propellants were studied individually, and at least four runs were performed on each propellant. The propellant concentrations in both the aqueous phase and the head space in sealed serum bottles were analyzed by a gas chromatographic method using an electron capture detector. Contrary to the albumin study, all of the partition coefficients in globulin--air systems are only slightly different from those in the plain buffer-air system. There is an insignificant degree of interaction in spite of statistically significant differences in some systems. The slight decrease of the partition coefficients of some propellants in the globulin solutions is due to the salting out effect of globulin.

54530 **APTIC NO. 78428**

Raymond, Richard B. and Richard B. Forbes

LEAD IN HAIR OF URBAN AND RURAL SMALL MAMMALS. *Bull. Environ. Contamination Toxicol., 13(5):551-553, May 1975. 18 refs.*

The amounts of lead in hair of small mammals (Sorex sp., Peromyscus maniculatus, Eutamias towsendii, and Microtus sp.) from urban and rural populations were determined. Both washed and unwashed samples of hair from roadside specimens contain significantly higher amounts of Pb (133.08 + or - 21.31 micrograms/g dry weight and 235.63 + or - 36.80) than the hair of the other three groups (parkland, wilderness, and antique). The unwashed hair samples from the roadside and antique groups (29.89 + or - 8.62) have significantly higher Pb content than the washed samples from the same animals (17.72 + or - 4.30 antique). The difference between washed (11.16 + or - 3.22) and unwashed (25.05 + or - 6.69) samples for park animals is not significant and no difference is detected for animals trapped in the wilderness.

54531 **APTIC NO. 78915**

Richards, R. J., Rashmibala Desai, P. M. Hext, and F. A. Rose

BIOLOGICAL REACTIVITY OF PVC DUST. *Nature (London), 256(5519):664-665, Aug. 21, 1975. 5 refs.*

The biological reactivity of polyvinyl chloride (PVC) dust was determined using a hemolysis technique. Two samples of PVC were tested (KM 1 and KM 2) both of which were obtained as finely divided dried powders which had been formed by standard processing procedures for use in fabrication work. Sample KM 1 was highly hemolytic at relatively low concentrations, 100% hemolysis being achieved by between 7.5 and 10 mg dust. Sample KM 2 was practically non-hemolytic. The washing of KM 1 reduced hemolytic potency of KM 1 by over 60%. Exposure to PVC dust of the KM 1 type constitutes an additional health hazard because of the increased biological activity of the dust.

54532 **APTIC NO. 78868**

Schmidt, F. and A. Wischnath

PROTECTION OF PASSIVE SMOKERS AT THE WORKING PLACE. A CONTRIBUTION TO WORKING PLACE REGULATIONS AND TO THE REFORM OF LAW CONCERNING PROTECTING OF YOUTH WORK. *(Nichtraucherschutz am Arbeitsplatz. Ein Beitrag zur Arbeitsstaettenverordnung und zur Reform des Jugendarbeitsschutzgesetzes). Text in German. Zentral. Arbeitsmed. Arbeitsschutz, 25(4):106-110, 1975.*

Arguments for the prohibition of smoking at working places to protect passive smokers are presented. Tobacco smoke, containing over 1000 different chemical compounds, including at least 20 carcinogens, such as 3,4-benzo(a)pyrene, has been known to be hazardous to health for a long time. In addition, the smoke emitted from cigarettes is even more harmful than the smoke inhaled. The particulate matter present in tobacco smoke is respirable, and carbon monoxide can cause even higher COHb levels than industrial and occupational exposure, in smokers and non-smokers alike, which may reduce the work performance considerably even before subjective complaints appear. Passive smoking is especially hazardous for allergic and asthmatic persons, subjects with cardiovascular disorders, and children. Further toleration of smoking at working places at a time when considerably less hazardous emissions have been limited and certain harmful substances have been banned, makes expensive air pollution control measures appear as outright illogical. In particular, smoking should be prohibited in the asbestos processing industry due to the known potentiation of the carcinogenic effect of asbestos by cigarette smoke.

54533 **APTIC NO. 78950**

Smith, V. Kerry

MORTALITY-AIR POLLUTION RELATIONSHIPS: A COMMENT. *J. Amer. Stat. Assoc., 70(350):341-343, June 1975. 13 refs.*

The mortality-air pollution relationships for specification errors were analyzed using the Ramsey specification error tests. The data for the analysis include information on the total mortality rates and the suspended particulates for 50 SMSA s for 1968 and 1969. The results for the Ramsey tests are tabulated. The critical values of each test statistic are defined to correspond to the 10% significance level. A statistically significant measured effect for air pollution is not a good guide to a correct specification. Most of the 36 models evidence significant pollution coefficients. Specification errors with such models can be a serious problem and depend on the mode estimated. (Author abstract modified)

54534 **APTIC NO. 78738**

Stauffer, D.

SCALING THEORY FOR AEROSOL DEPOSITION IN THE LUNGS OF DIFFERENT MAMMALS. *J. Aerosol Sci., 6(3/4):223-335, 1975. 14 refs.*

A scaling theory is developed for estimating aerosol deposition in the lungs of different mammals. The lungs are assumed to be all geometrically similar to each other, differing only by a scale factor proportional to W to the a power in their length (W is body weight). Then the deposition probability for inhaled aerosols to be deposited in the lungs is estimated by a dimensional scaling argument to be the same for different animals, if the radium is taken the same (for sedimentation or mixing dominated deposition) or changed proportional to W to the -0.1 power (for diffusion dominated deposition). (Author abstract modified)

54535 **APTIC NO. 78975**

Stemmer, Klaus L., Eula Bingham, and William Barkley

PULMONARY RESPONSE TO POLYURETHANE DUST.

Environ. Health Perspect., vol. 11:109-113, June 1975. 1 ref.

Weanling and 9-month or older rats were exposed to particles of a rigid polyurethane foam by intratracheal intubation. The dose was 5 mg of particles. The response of the lung tissue was examined morphologically by serial sacrifices. Inflammation and macrophage activity were the initial responses. Fibrosis developed after 6 mo. Nodular scars and perifocal emphysema were seen after 12 mo. Four rats had a papillary adenoma in a major bronchus after 18 mo exposure to freshly prepared particles. (Author abstract)

54536 **APTIC NO. 78766**

Stokinger, H. E.

TOXICOLOGY OF DIESEL EMISSIONS.

Bureau of Mines, Information Circ., vol. 8666:147-157, 1975. 15 refs. (Presented at the Symposium on the Use of Diesel-Powered Equipment in Underground Mining, Pittsburgh, Pa., Jan. 30-31, 1973.)

A toxicological evaluation is made of potential health hazards caused by diesel emissions in underground mines. The oxides of nitrogen and carbon pose the greatest threat to health. Smoke, with its absorbed, partly oxidized, and nitrated hydrocarbons, chiefly aldehydes and nitroparaffins, constitute an irritation and odor problem. They contribute to health effects by carrying the irritants to the deeper, more sensitive recesses of the lung, where they can act to initiate, promote, or accelerate emphysematous, fibrotic, or carcinogenic processes. Information is needed on the types and amounts of aldehydes, particularly unsaturated aldehydes, whether smoke adsorbed or free, and whether polycyclic aromatic hydrocarbons of the carcinogenic type are smoke-adsorbed. Poorly maintained diesel engines enhance toxic substances to the extent that uneconomic amounts of ventilation are required to reduce their levels to acceptable concentrations. Underground mine temperatures must be maintained below 80 F if greatly enhanced toxicity from unburned hydrocarbons is to be prevented. Kerosene produces the greatest enhancement of toxicity at elevated temperatures of 35 substances tested. (Author summary modified)

54537 **APTIC NO. 78438**

Suzuki, T., S. Nakazawa, M. Umeda, H. Goto, and S. Nagaoka

INFLUENCE OF OZONE-EXPOSURE ON BLOOD PART 1. EFFECT ON THE RESISTIVITY OF ERYTHROCYTE TO OSMOTIC PRESSURE.

(Ozone- bakuro no ketsueki e no eikyo Part 1. Sekkekyu shintoatsu teikosei e no eikyo). Text in Japanese. Tokyo-to kogai kenkyusho nenpo Annu. Rept., Tokyo Met. Res. Inst. Environ. Prot., vol. 6:270-272, 1975. 13 refs.

The change of resistivity of erythrocytes to osmotic pressure was examined as an indicator of ozone exposure, the major component of oxidants in photochemical smog. Blood specimens were obtained from 10-wk-old SD-JCL male rats exposed to ozone at 1 and 9 ppm and from rats not exposed to ozone. Hematological parameters were also determined. The resistivity of erythrocytes to osmotic pressure (concentration of sodium chloride for hemolysis) decreased immediately following exposure, compared with controls. This effect was marked in rats exposed to 9 ppm for 1 hr. However, resistivity returned to normal with time. Red blood cells hematocrit %, hemoglobin content, and the amount of HS-group in the blood obtained just after exposure to ozone for 1 hr showed no significant difference from those of controls. The activity of glucose 6-phosphate dehydrogenase in blood specimens taken just after exposure showed no significant difference from that of controls. A slight but significant decrease of erythrocytes in the specimens after exposure at 9 ppm and sodium ion versus potassium ion ATP-ase activity decreased significantly after ozone exposure, even at 1 ppm. The impairment of active transport affecting the balance of K plus and Na plus due to ozone exposure caused the decrease in resistivity of erythrocytes to osmotic pressure.

54538 **APTIC NO. 78729**

Swan, A. A. B.

INDUSTRIAL POLLUTION AND HEALTH.

J. Roy. Coll. Physicians, 9(2):129-137, Jan. 1975. 15 refs.

The relationship between industrial pollution and health in Great Britain is discussed. Death rates from bronchitis are compared for urban and rural areas in Great Britain. The annual mortality rates per 100,000 people (age 45-64) resulting from bronchitis are 71 for males and 15 for females in rural areas as compared to 106 and 20 for males and females, respectively, in urban areas (1959-1963). The mortality rate for children (up to 4 yr) is 11 per 100,000 in rural areas and 13 per 100,000 in urban areas (1960-1963). A review of environmental legislation designed to reduce levels of air pollution in Great Britain is presented.

54539 **APTIC NO. 78430**

Van Esch, G. J. and M. J. Van Logten

VINYL CHLORIDE: A REPORT OF A EUROPEAN ASSESSMENT.

Toxicology (Netherlands), vol. 4:1-4, 1975.

The essential points of the toxicity and carcinogenicity of vinyl chloride are summarized. Tumors of the skin, lungs, and bones in rats exposed to a high vinyl chloride concentration (30,000 ppm) in air for 4 hr daily on 5 days/wk for 12 mo are reported. There are strong indications that vinyl chloride exposure results in liver tumors in man. Indications of liver dysfunction are observed in individuals occupationally exposed to concentrations in the air varying from 10 to 300 ppm over periods up to 25 yr. Inhalation of vinyl chloride by dogs, rabbits, and guinea pigs over a period of 4-6 mo has not produced any signs of liver disturbance.

54540 **APTIC NO. 78834**

Watanabe, Tetsuya and Domingo M. Aviado

TOXICITY OF AEROSOL PROPELLANTS IN THE RESPIRATORY AND CIRCULATORY SYSTEMS. VII. INFLUENCE OF PULMONARY EMPHYSEMA AND ANESTHESIA IN THE RAT.

Toxicology (Netherlands), vol. 3:225-240, 1975. 11 refs.

The effects of an experimental induction of pulmonary emphysema on the sensitivity of the rat to toxicity from inhalation of aerosol propellants was investigated. The emphysematous rat shows an exaggerated reduction in pulmonary compliance in response to inhalation of trichlorofluoromethane (FC 11). In emphysematous and nonemphysematous rats without anesthesia the inhalation of FC 11 causes tachycardia, arrhythmias, and other abnormalities in the electrocardiogram. The tachycardiac response is eliminated by induction of barbiturate anesthesia, which increases the sensitivity of the heart to occurrence of abnormalities in the electrocardiogram in response to inhalation of FC 11 as well as of dichlorodifluoromethane (FC 12) and difluoroethane (FC 152a). The acceleration in heart rate in response to inhalation of FC 11, hypoxia, or hypercapnea is prevented by prior treatment with a beta blocking drug. (Author abstract modified)

54541 **APTIC NO. 78756**

FLUOROCARBON AEROSOL PROPELLANTS.

Lancet, 1(7915):1073-1074, May 10, 1975. 20 refs.

The toxic effects of fluorocarbon aerosol propellants are summarized. Ventricular arrhythmias are caused by aerosol propellants in conscious animals that are challenged with intravenous adrenaline in doses of 8 micrograms/kg. Inhaled concentrations as low as 1% of fluorocarbon -11 and 5% of dichlorotetrafluoroethane (fluorocarbon 114) cause ventricular arrhythmias under these circumstances. The greatest hazard arises when patients deliberately inhale fluorocarbons and sympathomimetic substances, as they do in the treatment of asthma. Fluorocarbon concentrations up to 5 micrograms/ml are found in arterial blood after one or two puffs from an inhaler. The concentrations required to sensitize conscious dogs challenged with adrenaline are higher 20-35 mg micrograms/ml. Repeated or continuous exposure of rats, dogs, monkeys, and guinea pigs to dichlorodifluoromethane (fluorocarbon 12) at concentrations of 4 micrograms/ml cause interstitial inflammatory changes in the lung with fatty infiltration and focal or submassive hepatic necrosis.

1974

54542 **APTIC NO. 78538**

Anderson, Robert J., Jr.

THE HEALTH COSTS OF CHANGING MACRO-CLIMATES. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 582-592. 4 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

A first effort to assess possible health costs associated with global changes in temperature, precipitation, windspeed, and ultraviolet radiation is summarized. Three different cost concepts are used. Comprehensive estimates of costs are computed as the sum of health-care costs, of non-monetary costs associated with consumption of health-care services, and of non-monetary costs associated with death. Special cost estimates are prepared for skin cancer.

54543 **APTIC NO. 78419**

Bruch J.

RESPONSE OF CELL CULTURES TO ASBESTOS FIBERS. *Environ. Health Perspect., vol. 9:253-254, 1974.*

The reactions of macrophages to asbestos and glass fibers was studied by light and by electron microscopy. Measurements were made of lactate dehydrogenase release, staining with erythrosine B, and lactate production. Size and shape of asbestos fibers have more effect than the physiochemical properties of the surface. Long fibers result in a protracted pathogenic but no acute cytotoxic effect. (Author abstract modified)

54544 **APTIC NO. 78920**

Bryce-Smith, D. and H. A. Waldron

LEAD POLLUTION, DISEASE, AND BEHAVIOUR. *Community Health, 6(3):168-175, 1974. 8 refs.*

Sources and health effects of atmospheric lead pollution are reviewed. Most of the Pb in gasoline is emitted in the exhaust gases as an aerosol containing particles of inorganic Pb. Some organic Pb is present, but the amount is usually less than 10% of the total. The size of these particles (0.18 to 0.90 micron) ensures maximum pulmonary penetration and absorption. The fallout of airborne particles produces very high concentrations of Pb in city dust, both inside and outside houses. Unpolluted soil contains about 15 ppm Pb, but samples of city dust contain 1000 to 6000 ppm. A daily intake of as little as 30 mg of dust containing 3% Pb produces clinical Pb poisoning in a few months. There is clear evidence to support the thesis that current levels in the environment are capable of producing behavioral abnormalities of types associated with educational disorders and delinquency, and also evidence that delinquents tend to have abnormal lead metabolism.

54545 **APTIC NO. 78399**

Casin, Ileana and N. W. Ghelberg

SERUM PROTEINS BEHAVIOUR IN THE URBAN POPULATION FROM A CENTRE WITH A LEAD-POLLUTED ATMOSPHERIC ENVIRONMENT. *(Comportarea unor proteine serice la populatia urbana dintr-un centru cu atmosfera poluata cu plumb). Text in Rumanian. Igiena (Bucharest), 23(8):457-461, 1974. 20 refs.*

Serum protein behavior was determined in an urban population from a center with a lead polluted atmospheric environment. The following increased amounts of serum proteins are found in 94 adult subjects: haptoglobin 75%; ceruloplasmin and transferrin 55%; IgA (immunoglobulin A) and IgG 40%; Igm and beta lc proteins 25%.

54546 **APTIC NO. 78488**

Dahms, Thomas E. and Steven M. Horvath

RAPID, ACCURATE TECHNIQUE FOR DETERMINATION OF CARBON MONOXIDE IN BLOOD. *Clin. Chem., 20(5):533-537, May 1974. 15 refs.*

A gas chromatographic technique for the determination of carbon monoxide in blood is described that utilizes a vortex method of gas extraction and a thermal conductivity detector. The method possesses the advantages of small sample volume (100 microliters), rapid analysis time (3 min), ease of operation, and high correlation with results from the standard gasometric method. The coefficient of variation for measurements of CO in human blood samples is 1.7%. The Bunsen solubility coefficient for plasma CO by the method is 22.0 ml of CO/l water/atmosphere as compared with a theoretical value of 21.8, indicating the accuracy of the method for dissolved CO measurements. (Author abstract modified)

54547 **APTIC NO. 78852**

Freour, Paul

EFFECT OF URBAN LIFE ON THE RESPIRATORY TRACT IN URBAN DWELLERS. *(Retentissement de la vie urbaine sur l appareil respiratoire des citadins). Text in French. Vie Med. Can. fr., 3(2):162-178, Feb. 1974. 88 refs.*

Studies on the effect of urban life on the respiratory tract are reviewed. Increased mortality due to respiratory tract diseases was observed on several occasions during events of high pollution level. Increased morbidity due to acute diseases of the respiratory tract, and increased absenteeism were determined among urban children during such events. It is, however, more difficult to establish valid relationships between the incidence of chronic bronchopathy and urban air pollution among adults due to the effect of smoking and other factors. The incidence of chronic bronchopathies is influenced by socio-economic factors. Tobacco smoking air pollution, and possibly asbestos play an important role in bronchial cancer in urban dwellers.

54548 **APTIC NO. 78554**

Green, A. E. S. and T. Mo

AN EPIDEMIOLOGICAL INDEX FOR SKIN-CANCER INCIDENCE. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 518-522, 17 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

An epidemiological index, based upon an analytic form of the latitudinal dependence of annual ultraviolet erythema dose, is presented. Allowances are made for variations in cloud cover, cloud and smog thickness, ground albedo, and ground elevation. A relationship between this index and skin-cancer incidence is also proposed. The change in the index with a fractional depletion of the ozone thickness is estimated. Simple relationships are suggested for estimating the changes in skin-cancer cases with fractional depletion of the ozone layer. (Author abstract)

54549 APTIC NO. 78404

Langer, Arthur M.

INORGANIC PARTICLES IN HUMAN TISSUES AND THEIR ASSOCIATION WITH NEOPLASTIC DISEASE. *Environ. Health Perspect., vol. 9:229-233, 1974. 25 refs.*

An increased gastrointestinal cancer risk is associated with occupational exposure to asbestos fiber. Examination of tissues obtained from extrapulmonary organs of exposed workmen demonstrates the presence of asbestos fibers and bodies. The amount of fiber present in these tissues is many magnitudes less than encountered in the lung tissues from the same individuals. Asbestos fiber may be present in organs which have limited direct contact with the outside environment by direct ingestion and blood or lymph routes. This demonstrates the ability of asbestos to infect the entire human body. Asbestos fibers are found in liver, spleen, and kidney of experimental animals after asbestos instillation into the lung. Inhalation of asbestos fiber invariably means dissemination of fiber throughout the body, although the number of fibers which may come to rest in extrapulmonary organs may be magnitudes less than are observed entrapped in lung tissues.

54550 APTIC NO. 78424

Luh, Ken-Tay, Low-Hsong Kuo, Chin-Chung Lin, Sze-Piao Yang, and Kung Pei Chen

PRIMARY LUNG CANCER IN TAIWAN. PART I. CHRONOLOGICAL OBSERVATION OF EPIDEMIOLOGICAL CHARACTERISTICS WITH ETIOLOGICAL CONSIDERATION. *(Taiwan chi yuan hua sin hue i ti pu liu sin bin hsue te jen chi nee tai kuan tsa ji binin te tan tau). Text in Chinese. (Tai-Wan I Hsueh Hui Tsa Chi (J. Formosan Med. Assoc.), 73(3):129-146, March 1974. 24 refs.*

The epidemiological charactertistics of primary lung cancer (bronchogenic carcinoma) in Taiwan and their chronological trends were studied. The crude mortality rate of lung cancer in Taiwan is around seven for male and four for female/100,000 population. It has increased 14 times for male and 17 times for female during the past 35 yr. The morbidity rate derived from a prevalence survey is higher, 12.1 for male and 5.5 for female/100,000. Histologic types of lung cancer among smokers and non-smokers are significantly different. The incidence of cancer in big cities is four times as high as that in villages. Cigarette smoke may act as tumor initiator and industrial fume and exhaust gas of motor vehicles may serve as promotors.

54551 APTIC NO. 78420

Ogawa, Michio, Shuji Shimazaki, Noriaki Tanaka, Takashi Ukai, and Tsuyoshi Sugimoto

BLOOD VOLUME CHANGES IN EXPERIMENTAL CARBON MONOXIDE POISONING. *Ind. Health (Japan), 12(3-4):121-125, Dec. 1974. 3 refs.*

Blood volume changes in dogs were determined using 51 chromium tagged red cells during and after experimental carbon monoxide exposure (0.6% in room air). Blood volume reduces by more than 20% of the initial volume during the CO exposure, which is mainly due to the reduction of plasma volume caused by the increased vascular permeability. This hemoconcentration is reversible by the application of the hyperbaric oxygenation. (Author abstract modified)

54552 APTIC NO. 78678

Okayasu, M.

TOPICAL IMMUNITY OF AIRWAYS AND TRANS-AIRWAY IMMUNIZATION. *(Kido no kyokusho meneki to keikido meneki). Text in Japanese. Nihon Kikan Shokudoka Gakkai Kaiho (J. Japan Broncho- Esophagolog. Soc.), 25(4):164-165, Sept. 1974. (Presented at the Japan Broncho-Esophagological Society, Annual Meeting, 26th, Hirosaki, Japan, Sept. 7-8, 1974.)*

The relationship between the infection in the respiratory tract and air pollution was studied. The inoculation of antigen through the airway and the production of antibody was substantiated by injecting bovine serum albumin and influenza viral vaccine into the airways of rabbits and detecting the intake of these antigens from the airway-alveolar system, the appearance of antibody-producing cells, and the change of antibody value in the blood and in the airway washings. The aforementioned values were higher in rabbits exposed to sulfur dioxide at 50 ppm and ozone at 10 ppm for 1 hr than in the controls, suggesting the effect of air pollution on natural sensitization or infection. The damage of airway epithelial cells by transnasal infection with influenza virus on mice was apparent, suggesting the ease of air pollutant invasion and secondary infection. The repeated exposure to SO2 or ozone sometimes caused a decrease in mortality, suggesting the complexity of the effect of air pollution and infection on the body. The IgA-containing airway cells and IgA in the airway washings of rabbits were detected, and the effects of trans-airway inoculation and exposure to ozone and dexamethasone on airway IgA were examined.

54553 APTIC NO. 78903

Omachi, S. and H. Kita

EFFECT OF AIR POLLUTANTS ON CILIARY ACTIVITY OF RESPIRATORY TRACT. *Bull. Tokyo Med. Dent. Univ., 21(4):327-343, Dec. 1974. 19 refs.*

The effect of sulfur dioxide, nitrogen dioxide, nitric oxide, ozone, and formaldehyde on the ciliary activity of an excised specimen of the trachea of a guinea pig was investigated. The influence of these gases is determined by the Half Reduction Time of the ciliary activity, which is the time lapse from the beginning of the gas exposure at a certain concentration to the point of which the activity is reduced by half. The Half Reduction Time of the ciliary activity by each gas at the concentration of 50 ppm is SO2, 4 min; HCHO, 5 min; NO2, 10 min; NO, 14 min; and O3, 20 min. The influence of the easily water soluble gases such as SO2 and HCHO on the ciliary activity is severe compared with the less water soluble ones, NO2 and O3, which pass over the mucous surface of the upper airway without dissolving to the mucous layer. (Author abstract modified)

54554 APTIC NO. 78732

Raven, P. B., B. L. Drinkwater, S. M. Horvath, R. O. Ruhling, J. A. Gliner, J. C. Sutton, and N. W. Bolduan

AGE, SMOKING HABITS, HEAT STRESS, AND THEIR INTERACTIVE EFFECTS WITH CARBON MONOXIDE AND PEROXYACETYL NITRATE ON MAN S AEROBIC POWER. *Intern. J. Biometeorol., 18(3):222-232, Oct. 1972. 31 refs.*

The interactive effects of age, smoking habits, and heat stress with carbon monoxide and peroxyacetyl nitrate inhalation on human aerobic power were examined. The subjects included 16 healthy middle-aged males (40-57 years); nine were nonsmokers and seven were smokers. There was no significant change in maximum aerobic power related to the presence of either air pollutant, although total working time was lowered at a temperature of 25 C for subjects breathing 50 ppm CO. Older nonsmokers did show a decrement in maximum aerobic power while breathing 50 ppm CO, while older smokers failed to show any change. This difference, however, was related to the initial carboxyhemoglobin levels of the smokers who, when breathing this level of CO, showed only a 14% increase in COHb over the initial level as compared to a 200% increase in the nonsmokers. Smoking habits were the most influential factor affecting cardiorespiratory responses to maximal exercise in older men. Regardless of ambient conditions, smokers showed a significantly lower (27%) aerobic power than nonsmokers. They were also breathing closer to their maximal breathing capacities throughout the exercise period and showed a higher respiratory exchange ratio. The maximum aerobic power of nonsmokers was only 6% less than that of younger nonsmokers working under similar conditions, while the aerobic power of the older smokers was 26% lower than that of young smokers (24 years). (Author abstract modified)

54555 **APTIC NO. 78405**

Schneiderman, Marvin A.

DIGESTIVE SYSTEM CANCER AMONG PERSONS SUBJECTED TO OCCUPATIONAL INHALATION OF ASBESTOS PARTICLES: A LITERATURE REVIEW WITH EMPHASIS ON DOSE RESPONSE. *Environ. Health Perspect., vol. 9:307-311, 1974. 9 refs.*

Human data on a dose response relationship between industrial exposure to asbestos and later development of cancer on the bronchus and lung and of cancer of the digestive tract are reviewed. There is an increase of digestive tract cancer associated with inhaled asbestos. The proportionality factor for converting inhaled dose to ingested dose to produce digestive cancer with rates at the same level as bronchiogenic cancer ranges from 1/20 to 1/1. For both bronchiogenic cancer and gastric cancer, the data do not provide strong evidence for a threshold or for the existence of a clear safe level of exposure. Increased exposure to inhaled asbestos particles leads to increased digestive system cancer. (Author abstract modified)

54556 **APTIC NO. 78496**

Shishido, Sachiko and Tsuguyoshi Suzuki

MERCURY IN HUMAN HAIR: A COMPARATIVE STUDY BY USING TWO DIFFERENT METHODS OF ATOMIC ABSORPTION AND NEUTRON ACTIVATION ANALYSIS. *Tohoku J. Exp. Med. (Tokyo), 113(4):351-356, 1974. 7 refs.*

A method for the selective determination of inorganic and organic mercury in human hair by atomic absorption spectrometry is compared with an atmoic absorption method using hydrogen chloride extracts of hair and with a neutron activation technique. The method for the selective determination of inorganic and organic mercury involves using tin chloride for the reduction of Hg(II) to metallic mercury; it also employs cadmium chloride for splitting the carbon-mercury bond in organic mercury compounds. The method is applicable to human hair analyses after digestion of the sample in a solution of 45% sodium hydroxide. A comparison of the levels of organic mercury determined by the selective atomic absorption method with those obtained with the HCl-extract method reveals good agreement (correlation coefficient of 0.839). The agreement between values of total mercury, inorganic mercury, and organic mercury obtained with the selective atomic absorption method versus those obtained with neutron activation is also good, the correlation coefficient being 0.985. (Author abstract modified)

54557 **APTIC NO. 78400**

Sturm, W.

PLEURAL MESOTHELIOMAS AND ASBESTOS EXPOSURE. *(Pleuramesotheliome und Asbestexposition). Text in German. Z. Erkrankungin Atmungsorgane, 141(1):24-30, 1974. 103 refs.*

A total of 207 cases of mesothelioma recorded in the districts of Halle and Magdeburn from 1960 to Aug. 1973 is reported of which 77% are male. Asbestos exposure is found in 92% of cases. Exposure took less than 5 yr in 25% of cases; 42% died before age 65. In addition to mesothelioma, an asbestosis of pulmonal or pleural form is found in 31% of the cases with a cleared asbestos exposure. The eventual role of air pollution by asbestos dust in large towns and industrial regions is discussed.

54558 **APTIC NO. 78415**

Suzuki Y.

INTERACTION OF ASBESTOS WITH ALVEOLAR CELLS. *Environ. Health Perspect., vol. 9:241-252, 1974.*

Electron microphotographs are presented showing the various aspects of phagocytosis of asbestos fibers in lung tissue. The fibers are rapidly phagocytosed by alveolar macrophages, by polymorphonuclear leucocytes, and less frequently by alveolar epithelial cells. They are found in the cytoplasm of the alveolar stromal macrophages. In the late stage of the disease, macrophages containing the mineral are recognized in the fibrous submesothelial connective tissues. The process of phagocytosis of the fibers is similar to that of other microparticles such as Thorotrast and India ink. The fate of the phagocytosed fibers varies. Some are partly dissolved or digested with marked reduction in the thickness of the wall of the chrysotile fibril. Many become coated by hemosiderin which accumulate in the cytoplasm of the phagocytic cells. This coating transforms the fibers into asbestos bodies. Uncoated fibers as well as various stages of phagocytosis are observed in all animals including those studied 1-2 after the instillation of asbestos. This strongly suggests that fibers may be repeatedly phagocytosed, released and rephagocytosed, inducing a continuous response of the alveolar cells and maintaining the disease. (Author abstract modified)

54559 **APTIC NO. 7[illegible]0**

Tsuchiya, K.

PERSPECTIVE ON THE ENVIRONMENTAL TOXICOLOGY OF HEAVY METALS. *(Jukinzoku no kankyo chudokugaku). Text in Japanese. Sangyo Igaku (Jap. J. Ind. Health), 16(4):427-437, Sept. 1974. 37 refs.*

The basic toxicology of metals in relation to absorption, excretion, and biological half-life discussed. Results of studies on minute particles as air pollutants are reviewed. Although it is difficult to measure the exact amount of exposure, significant relationships are found between lead concentrations in blood and in the air.

54560 **APTIC NO. 78540**

Urbach, Frederick, Danier Berger, and Ronald E. Davies

FIELD MEASUREMENTS OF BIOLOGICALLY EFFECTIVE UV RADIATION AND ITS RELATION TO SKIN CANCER IN MAN. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 523-534, 26 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The development and construction of a filter-phosphor-phototube instrument with an action spectrum sufficiently close to that of human skin erythema solare is described. Preliminary results from measurements with such instruments at six widely separated stations varying in latitude from 31.8 deg north to 44.9 deg north are discussed. Preliminary measurements and extensive calculations of the probable effect of stratospheric ozone depletion are used to estimate the effect of atmospheric perturbation on the incidence of human skin cancer in the USA. The most conservative estimates suggest that a 5% decrease in ozone would result in an eventual increase of from 30,600 to 46,000 additional cases of skin cancer per year, approximately 10 to 15% of the present incidence rate. (Author abstract modified)

1973

54561 **APTIC NO. 78590**

Goldstein, E., D. Warshauer, P. D. Hoeprich, and M. C. Eagle

THE EFFECT OF AIR POLLUTANTS (OZONE AND NITROGEN DIOXIDE) ON MURINE RESISTANCE TO PULMONARY BACTERIAL INFECTION. *Aerobiol. Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 220-224. 23 refs.*

The effect of ozone and nitrogen dioxide on pulmonary resistance to infection was investigated by exposing mice to radiolabelled Staphylococcus aureus and to ozone concentrations ranging from 0.57-4.25 ppm or NO2 concentrations ranging from 2-15 ppm. Pulmonary bacteriacidal activity was measured following the exposures. Both ozone and NO2 adversely affected the antibacterial defense mechanisms of the murine lung. Since there was an equivalent loss of radiophosphorus in oxidant-treated and control mice, the impairment in antibacterial activity was due to an inhibition of intrinsic bacteriacidal activity rather than differences in rates of physical removal. Exposures to NO2 failed to cause a reduction in the number of inhaled bacteria, whereas similar exposures to ozone significantly decreased the number of inhaled bacteria. Relatively lower levels of NO2 caused a decrease in pulmonary bacteriacidal activity due to the fact that NO2 did not evoke the protective mechanism observed for ozone.

54562 **APTIC NO. 78591**

Loosli, C. G., R. D. Buckley, S. Y. Hwang-Kow, M. S. Hertweck, H. D. Hardy, and R. Serebrin

EFFECT OF AIR POLLUTANTS ON RESISTANCE OF MICE TO AIRBORNE INFLUENZA A VIRUS INFECTION. *Aerobiol., Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 225-231. 14 refs.*

Groups of mice exposed to nitrogen dioxide, sulfur dioxide, and ozone were subsequently challenged, alone with unexposed mice, to heavy lethal clouds of influenza A virus. No differences in lung virus growth or lung virus titers were observed between the exposed and unexposed mice. Control mice and NO2-exposed mice challenged with sublethal airborne influenza virus infection also showed the same degree of virus growth in the lungs and similar antibody reactions. Mice exposed to synthetic smog likewise showed no differences in lung virus growth and antibody responses after challenge to infection when compared with a control group exposed to filtered air and the virus. Male mice were more susceptible to influenza virus infection than were female mice. (Author summary modified)

54563 **APTIC NO. 78486**

Quick, T. C. and E. Paulini

ATMOSPHERIC POLLUTION AND RESPIRATORY DISEASES IN BELO HORIZONTE. *(Contribucao ao Estudio da Poluicao Atmosferica e das Doencas Pulmonares em Belo Horizonte. Text in Portuguese. Academia Mineira Medicina, 54p., 1973. 11 refs.*

Air pollution due to carbon monoxide and particulate matter was studied in the metropolitan area of Belo Horizonte, Minas Gerais, Brazil. Data on the incidence of respiratory diseases in various population groups was also analyzed. Qualitative and quantitative variations in the dust content of the air were noted in various parts of the city. Carbon monoxide reached very high levels under certain conditions. Diseases of the respiratory tract showed a significant increase during the drier months. A review of preventive measures used in the Netherlands and West Germany indicated that pollution levels could be reduced without large expenditures. Industrial growth in Belo Horizonte is expected to increase the risk of air pollution, so that certain anti-pollution measures need to be adopted. These would include an educational program, regulation of the efficiency of combustion motors, introduction of forced-air ventilation into a city tunnel, establishment of an air quality agency and maximum tolerance levels for various types of industry, better zoning, and stimulation of further research on the effects of air pollution.

54564 **APTIC NO. 78683**

Suzuki, S. and T. Takemoto

ON THE EFFECTS OF MINUTE AMOUNTS OF LEAD IN THE ATMOSPHERE; PART II. *(Taiki chu biryo namari no eikyo ni tsuite (2)). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10)Special Suppl.:no.563, Oct. 1973. (Presented at Annual Lecture Meeting of the Japan Society of Public Health, 32nd, Hirochima, Japan, Oct. 1973.)*

The effects of ambient lead on various physiological functions and on environmental awareness of the inhabitants of a city of about 150,000 people, within the Tokyo metropolitan area were investigated. There were no large factories in the area. The study consisted of 91 persons, of whom 49 (I) lived facing the motor road, 26 (II) lived less than 50 m from the motor road, 16 (III) lived betweem 51-100 m from the road and 4 (IV) lived more than 100 m from the road. The specific gravity of urine hemoglobin, delta-aminolevulinic acid dehydrogenase in erythrocyte, lead in the blood and urine, delta-aminolevulinic acid and coproporphyrin in the urine of these persons were determined. The values in Group I were: 1.00717 + or - 0.00385, 12.55 + or - 1.07 g/dl, 212 + or - 63 units, 16.2 + or - 8.2 micrograms/dl, 17.1 + or - 9.3 micrograms/l, 2.00 + or - 0.95 mg/l and 23.5 + or - 14.2 micrograms/l. The values in Group II were: 1.00856 + or - 0.00599, 13.24 + or - 1.21 g/dl, 198 + or - 67 units, 20.6 + or - 16.3 micrograms/dl, 18.1 + or - 8.7 micrograms/l, 1.89 + or - 0.80 mg/l and 26.1 + or - 17.2 micrograms/l. The values in Group IV were: 1.00855 + or - 0.00589, 12.05 + or - 1.58 g/dl, 202 + or - 57 units, 13.8 + or - 7.9 micrograms/dl, 17.2 + or - 8.2 micrograms/l, 2.04 + or - 0.85 mg/l and 29.2 + or - 22.5 micrograms/l. No biological effect of minute aerial concentrations of lead, 2-3 micrograms/cu m, on the body was observed. Awareness of lead was 60% among people in agricultural occupations, and 80% among people in commercial occupations.

1971

54565 **APTIC NO. 78489**

Laskin, Sidney, Marvin Kuschner, Robert T. Drew, Vincent P. Cappiello, and Norton Nelson

TUMORS OF THE RESPIRATORY TRACT INDUCED BY INHALATION OF BIS(CHLOROMETHYL)ETHER. *Arch. Environ. Health, vol. 23:135-136, Aug. 1971. 3 refs.*

Histological examinations of 19 Sprague-Dawley rats exposed to 0.1 ppm bis(chloromethyl)ether for 6 hr/day, 5 days/wk over periods up to 659 days are described. Squamous cell carcinomas of the lung were observed in five of the animals examined; esthesioneuroepitheliomas arising from the olfactory epithelium were also observed in five cases. Both types of tumors were observed in one animal, making the total number of tumor-bearing animals equal to nine. The pulmonary carcinomas were seen in animals who died from 332 to 463 days after the onset of exposure, and the nasal tumors were observed in animals dying from 346 to 488 days after the initial exposure. The findings imply a significant occupational hazard associated with industrial exposure to bis(chloromethyl) ether.

1966

54566 **APTIC NO. 78485**

Cernelc, Draga

RESULTS OF THE TREATMENT OF INFANTILE BRONCHIAL ASTHMA. *(Rezultati klimatske terapie pri bronhialni astmi v ostroskem obdobju v jugoslaviji). Text in Slovak. Zdrav. Vestn., 35(9/10):317-325, 1966.*

Of 478 Yugoslavian children treated for bronchial asthma by climate therapy, hyposensitization, or both, 85 patients were selected for special study to determine the effect of climate therapy duration. Of the 85, 45 were females and 27 came from substandard social conditions. Of the 60 who were treated at mountain resorts, 41 received treatment for 3 wk and 19 for 3 mo. Of the 25 treated at seaside resorts, 17 stayed for 3 wk and 8 for 3 mo. All 85 were given blood and urine lab tests, with determinations of lung function and of body weight before and after treatment. A 5-yr follow-up of thrice-yearly examinations was conducted for all 478 cases. The wider study showed that a combination of climate and hyposensitization treatments was the most effective approach. A longer stay at the resort area produced consistently higher rates of improvement. No significant difference was noted between the mountain and seaside groups.

EFFECTS-PLANTS AND LIVESTOCK

1975

54567 **APTIC NO. 78480**

Aronson, Arthur L.

SOURCES AND PATHWAYS OF LEAD IN DOMESTIC ANIMALS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 10p., 1975. 49 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-18.4.)*

Sources and pathways of lead in domestic animals are reviewed. Lead poisoning in cattle can occur if the animals ingest crops or pasture forage contaminated by lead from fumes and dusts emitted from industrial lead operations or motor vehicles. The ingestion of lead-contaminated hay or forage appears to be the most common source of the metal in the poisoning of horses and sheep. A daily lead intake of 1.7 mg/kg body weight can produce clinical signs of lead poisoning in horses, while a daily intake of approximately 6-7 mg/kg is required to produce clinical signs of poisoning in cattle. Potentially lethal concentrations of lead in forage are approximately 80 ppm (dry weight) for horses and in excess of 200 ppm for cattle. Even though roadside grasses contain high concentrations of lead, it is unlikely that domestic animals consume an amount sufficient to produce clinical signs of poisoning. However, such grass does pose a hazard to the animals health and to the edible products in food producing animals. A lead concentration as high as 0.3 ppm was observed in the milk of a cow exposed to lead. (Author abstract modified)

54568 **APTIC NO. 78958**

Bennett, J. H., A. C. Hill, Abbas Soleimani, and W. H. Edwards

ACUTE EFFECTS OF COMBINATION OF SULPHUR DIOXIDE AND NITROGEN DIOXIDE ON PLANTS. *Environ. Pollut., 9(2):127-132, Sept. 1975. 21 refs. (Presented at the International Congress of Plant Pathology, 2nd, Minneapolis, Minn., Sept. 4-12, 1973, Paper 3.)*

Several crop species were fumigated with nitrogen dioxide, sulfur dioxide, and mixtures of SO2 and NO2 in two identical, internal-recirculating, environmental chambers. Treatments consisted of 1 hr and 3 hr fumigation with the pollutants separately and with equal volume mixtures of SO2 and NO2 in concentrations ranging from 0.125 to 1.0 ppm. No visible injury resulted to any experimental plants treated with NO2 alone nor from SO2 exposures to concentrations of less than 0.50 ppm. Radish was the most sensitive species tested. The minimum exposure doses which caused visible injury to radish leaves were 1 hr exposures to a 0.50 ppm SO2+NO2 mixture or to 0.75 ppm SO2 alone. Swiss chard, oats, and sweet peas required treatments with 0.75 to 1.0 ppm SO2 alone or SO2 plus NO2 before injury was detected. The data indicate that SO2 and NO2 in combination may enhance the phytotoxicity of these pollutants, but relatively high doses were required to cause symptoms of injury. (Author abstract)

54569 **APTIC NO. 78726**

Bishop, J. A., L. M. Cook, J. Muggleton, and M. R. D. Seaward

MOTHS, LICHENS AND AIR POLLUTION ALONG A TRANSECT FROM MANCHESTER TO NORTH WALES. *J. Appl. Ecology, 12(1):83-98, April 1975. 22 refs.*

The light reflectance of, the type of epiphyte cover on, and the lichen flora of samples of oak trees at 53 sites along a transect from Manchester to North Wales is recorded. These data are used to estimate levels of smoke and sulfur dioxide using two methods based on plant indicators. The estimates are compared with physical measurements available for 16 sites. There is a clear decline in air pollution along the transect. Values for the winter 6 mo fall from 170 micrograms/cu m SO2 and 100 micrograms/cu m smoke to 40 micrograms/cu m SO2 and 10 micrograms/cu m smoke. Two species of moth, Biston betularia and Gonodontis bidentata adopt different resting positions in experimental situations. B. betularia remains exposed on flat surfaces and G. bidentata has a secretive response resting in cracks and under ledges. A total of 93% of the variation in frequency of carbonaria in B. betularia is accounted for by number of lichen taxa, grid reference and cover by crustose lichen, but a correlation is obtained when the grid reference is omitted. (Author summary modified)

54570 **APTIC NO. 78829**

Catcheside, D. G.

CHEMICALS, RADIATIONS AND HEREDITY. *Search, 6(1-2):23-28, Jan.-Feb. 1975. 10 refs. (Presented at the Society of Automotive Engineers-Australasia, National Convention, Melbourne, Australia, 1973.)*

The abilities of plants to adapt to, resist, or tolerate air pollutants is discussed. Plants which are good indicators of atmospheric pollution are bryophytes (mosses and liverworts) and lichens. Few species are found in industrial urban areas. The vulnerability of a given plant to pollution is affected by the nature of the surface on which it is growing. In part the effect is one of provision of nutrients, of which nitrogenous and associated materials seem important. The differences in tolerance displayed by different species suggest differences in physiology determined by heredity. Many heavy metals are toxic to higher plants in anything more than trace amounts, but various grasses (Armeria sp and others) grow on spoil heaps around disused mines. They are variously tolerant of the metals which is hereditary. Strains able to tolerate toxic metals do so by taking up the metals and sequestering them in the walls of the cells. Bacteria and fungi, typically, are sensitive to a number of agents which are deliterious to them, but are able to throw up resistant strains by mutation. In general, plants adapt by mutation and selection to resist some chemicals, such as heavy metals, which are poisonous to enzymes. Except in the presence of the toxic chemical, however, the resistant strains are less fit than normal strains, so the prospects for breeding plants resistant to chemical poisons and also highly productive are not good. Some chemicals cause damage similar to that due to radiation, and are therefore hazardous to the genetic material.

54571 **APTIC NO. 78429**

Hamelin, C. and Y. S. Chung

THE EFFECT OF LOW CONCENTRATIONS OF OZONE ON ESCHERICHIA COLI CHROMOSOME. *Mutat. Res., 28(1):131-132, April 1975. 17 refs.*

The effect of 0.01 ppm concentrations of ozone on the chromosomes of Escherichia coli was investigated. Ozone induces mutation in a wide range of genes responsible for the nutritional properties of E. coli. Of the 55 auxotrophs scored and identified as to their exact nutritional requirements, 16 of them show requirements for two or more growth factors. These include most common amino acids, vitamins, purines, and pyrimidines. A great number of mutant strains are either more resistant or more sensitive to ultraviolet light irradiation than the parental strain MQ259. Numerous mucoid strains form excessive amounts of capsular polysaccharide after treatment with O3.

54572 **APTIC NO. 78746**

Hanson, George P., Linda Thorne, and Daniel H. Addis

THE OZONE SENSITIVITY OF PETUNIA HYBRIDA VILM. AS RELATED TO PHYSIOLOGICAL AGE. *J. Am.SSoc. Hort. Sci., 100(2):188-190, March 1975. 7 refs.*

Sets of six multiflora Petunia F1 hybrids representing eight different age groups were simultaneously fumigated with 0.2 ppm ozone for 8 hr. The more sensitive hybrids acquire a marked O3 tolerance upon visible differentiation of a floral bud. The acquired tolerance is manifested several nodes beneath the lowest flowering node. The more tolerant hybrids develop a greater tolerance (greater percentage of nodes whose leaves exhibited no O3 injury) and acquire it prior to the visible differentiation of a floral bud. The oldest uninjured leaves on tolerant hybrids have a significantly higher leaf plastochron index than do the oldest uninjured leaves of the sensitive hybrids. The tolerant hybrids have some mechanism which protects leaves of an older physiological age. (Author abstract modified)

54573 APTIC NO. 78402

Hawksworth, D. L.

LITERATURE ON AIR POLLUTION AND LICHENS II. *Lichenologist, 7(1):62-66, 1975. 56 refs.*

An annotated bibliography of 56 references on air pollution and lichens is presented. The topics include: changes in lichen flora in various geographical areas due to air pollution; effect of air pollution of nitrogen fixation in lichens; growth of lichens in areas surrounding sulfur dioxide and fluoride pollutants; effect of air pollution on different lichen species; fumigation experiments with SO2; and use of lichens as air pollution indicators.

54574 APTIC NO. 78807

Kitano, H., T. Shinohara, Y. Yamamoto, T. Kimura, H. Kitanosono, and M. Fukuda

STUDIES ON WEATHER FLECK ON TOBACCO LEAVES. *(Tabaco no seiriteki hantenbyo ni kansuru kenkyu). Text in Japanese. Okayama Tabaco Shikenjo Hokoku (Bull. Okayama Tob. Exp. Stn.), no. 35:23-34, March 1975. 16 refs.*

Oxidants concentrations at tobacco-growing areas in Okayama, Tottori and Hyogo prefectures were measured from 1972 to 1974. Sulfur dioxide concentration and weather conditions were studied and correlated to the incidence of tobacco fleck at Okayama Tobacco Experiment Station from 1970 to 1974. The highest daily concentrations of oxidants at six locations from May 15 to June 23, a period with the highest incidence of fleck, ranged from 4.1 ppm at Tottori to 6.7 ppm at Tamashima in 1973 and from 3.7 ppm at Tottori to 7.3 ppm at Takahashi in 1974. The highest oxidants concentration appeared mostly in the afternoon between 13:00 and 15:00. The oxidants concentration was generally high on a sunny day with low wind velocity between 2 m/s and 4/ms. The average SO2 concentration at the Experiment Station was 3.0 ppm in 1970 and 1971 and 2.5 ppm in 1972. High incidence of tobacco fleck was found in Tamashima, Oku, Takahashi and Tsuyama. No apparent relationship was found between the oxidants concentration and SO2 concentration.

54575 APTIC NO. 78956

Mandl, Richard H., Leonard H. Weinstein, and Monica Keveny

EFFECTS OF HYDROGEN FLUORIDE AND SULPHUR DIOXIDE ALONE AND IN COMBINATION ON SEVERAL SPECIES OF PLANTS. *Environ. Pollut., 9(2):133-143, Sept. 1975. 26 refs. (Presented at the International Congress of Plant Pathology, 2nd, Minneapolis, Minn., Sept. 4-12, 1973, Paper 4.)*

Bean, barley, and sweet corn were exposed separately to charcoal-filtered air, hydrogen fluoride, sulfur dioxide, and a combination of the two pollutants. Plants in two experiments were exposed to 0.006 to 0.0009 ppm HF, to 0.15 or 0.30 ppm SO2, and to the combined pollutants for 7 days. Two other experiments used 0.06 to 0.08 ppm SO2, and exposures were made for 27 days. When high concentrations of SO2 were used, severe injury occurred on corn and barley leaves, and the combination of SO2 and HF did not alter foliar symptom production. Beans were not injured by any of the treatments. The foliar response of barley and corn was accentuated by the combination of SO2 and HF with lower concentrations of SO2. Symptoms consisted of elliptical lesions on the distal half of older leaves on both of the corn cultivars tested. Foliar accumulation of fluoride was reduced by the combination of SO2 and HF as compared with HF alone. Fresh and dry weight yields of plant tops were not affected. (Author abstract)

54576 APTIC NO. 78861

Ratcliffe, J. M.

AN EVALUATION OF THE USE OF BIOLOGICAL INDICATORS IN AN ATMOSPHERIC LEAD SURVEY. *Atmos. Environ., 9(6/7):623-629, June/July 1975. 21 refs.*

Atmospheric lead deposition was monitored in the vicinity of a battery factory by an integrated survey of Pb levels in indigenous moss and grass samples and by a short term study of weekly increments in Pb deposition at selected sites around the source using the mossbag technique. There is a highly significant correlation between the Pb content in indigenous mosses and grass. The Pb levels closely reflect the proximity to the source and the long term wind pattern. The suspended mossbags adequately monitor the input to ground moss and grass given sufficient exposure time for slow accumulation rates. The spatial variation in mossbag Pb content after 1 mo correlates significantly with wind direction and speed and with calculated mean long term ground level concentrations from stack emissions at each site. Only 40% of the temporal (weekly) variation in Pb accumulation in the mossbags can be explained by correlation with the wind direction and speed and rainfall at each site. (Author abstract modified)

54577 APTIC NO. 78773

Tuerk, R. and V. Wirth

THE PH DEPENDENCE OF SO2 DAMAGE TO LICHENS. *Oecol., 19(4): 285-291, 1975. 18 refs.*

The influence of the hydrogen ion concentration on the damage exerted to lichens by sulfur dioxide gas was investigated. Thalli of the species Hypogymnia physodes and Xanthoria parientina were submerged in buffer solutions of pH 2 to pH 8 and subsequently exposed to SO2 gas. The degree of damage to the lichens after exposure to 4 mg of SO2/cu m air for 14 hr is dependent on the pH of the buffer solutions. Hypogymnia physodes shows the least damage at pH 7, X. parientina at pH 5 to pH 7. The degree of damage increases with increasing acidity. After exposure to SO2 gas at pH 3 no apparent photosynthesis is achieved. The mere shift of the pH into the strong acid range of pH 3 and pH 2 damages the lichens. Xanthoria parientina is more seriously damaged than H. physodes. Basicity is harmful to the lichens in the low range of pH 8. Xanthoria parietina is less affected than H. physodes. (Author abstract modified)

54578 APTIC NO. 78957

Weinstein, L. H., D. C. McCune, A. L. Aluisio, and P. Van Leuken

THE EFFECT OF SULPHUR DIOXIDE ON THE INCIDENCE AND SEVERITY OF BEAN RUST AND EARLY BLIGHT OF TOMATO. *Environ. Pollut., 9(2):145-155, Sept. 1975. 11 refs.*

The effects of less than 20 pphm sulfur dioxide on the incidence and severity of bean rust and early blight of tomato were studied. Pinto bean plants and tomato plants were grown in a greenhouse supplied with charcoal-filtered air until the beginning of the experimental period. Half the plants exposed to SO2 before inoculation were returned to the chamber providing SO2 and half placed in the control chamber. Similarly, half the plants that had not been exposed to SO2 before inoculation were returned to the control chamber and half placed in the SO2 chamber. The effect of SO2 on bean rust consisted of a decrease in the incidence and severity of the disease and in the size and percentage germination of uredospores. These effects resulted from exposure of plants to SO2 before or after inoculation with the pathogen, but exposures before inoculation were more effective. Sulfur dioxide did not affect early blight of tomato. (Author abstract modified)

54579 **APTIC NO. 78474**

Westermann, H. D., A. Thalmann, and H. Kummer

THE TOXICITY OF HYDROGEN SULPHIDE IN ANIMAL FEEDING. A SURVEY OF THE LITERATURE. *(Ueber die Toxizitaet von Schwefelwasserstoff in der Tierfuetterung). Text in German. Landwirtsch. Forsch., 28(1):70-80, 1975. 42 refs.*

Hydrogen sulfide can be rapidly introduced into the circulation of the blood of domestic animals with the inhaled air via the lungs or, as sulfide with contaminated fodder, via the digestive tract. The severity of the hydrogen sulfide poisoning depends on the concentration of hydrogen sulfide in the blood. This is influenced less by the total intake of hydrogen sulfide than by the concentration in which the hydrogen sulfide in the air or in the digestive tract reacts on the organism. Hydrogen sulfide from the air is removed from the body by eructation and intestinal gases. Hydrogen sulfide is likewise oxidized to sulfate and excreted with the urine. Apart from protracted incidence through continually increasing introduction of hydrogen sulfide or its formation in the digestive tract, sequelae do not occur. Lethal doses lead to stoppage of respiration and of the heart. The following recommendations are indicated for livestock: in the total ration for horned cattle there should not be more than 0.5% of sulfur or of sulfur compounds, in that for sheep, not more than 1%; in the ration for pigs there should not be more than 0.03% of sulfide, and in that for young poultry, not more than 0.1%. (Author abstract modified)

54580 **APTIC NO. 78648**

Yee, Mon S., Hinrich L. Bohn, and Seiichi Miyamoto

SORPTION OF SULFUR DIOXIDE BY CALCAREOUS SOILS. *Soil Sci. Soc. Am. Proc., 39(2):268-270, March-April 1975. 14 refs.*

The capacities and rates of sulfur dioxide sorption by calcareous soils were measured using a steady-state method in which a stream of air plus SO2 passed rapidly through the soil. Air-dry calcareous soils at room temperature were saturated with SO2 within 10-15 min from a dry gas stream. The sorption capacities which ranged from 0.4-1.6 g of S/100 g of soil at 0.34% SO2 in air increased with SO2 concentration and specific surface of the soils. Moisture in the air and/or soils increased the SO2 sorption capacities to 0.8-6.4 g of S/100 g of soil which is approximately equivalent to the acid- titratable basicities; however, saturation required several hours. The initial sorption rate ranged from 0.06-0.29% S/min in the moist soils. The sorption properties of the soils studied offer potential for the design of sorption bed or solid scrubbing systems.

54581 **APTIC NO. 78479**

Zimdahl, Robert L.

ENTRY AND MOVEMENT IN VEGETATION OF LEAD DERIVED FROM AIR AND SOIL SOURCES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. 67 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-18.3.)*

Lead uptake and translocation by plants and its subsequent effects are reviewed. Lead is taken up by many plants primarily via their roots. Large amounts of lead are deposited on plant foliage, but most remains as a topical deposit. Nevertheless, foliar uptake is also a demonstrated fact. Soil lead levels above 1000 ppm are assumed to be required to cause observable plant effects. Environmental variables, plant age, and species are important determinants of lead uptake. Increasing soil lead availability increases plant uptake; whereas increasing soil phosphorus, organic content, and pH decrease plant uptake. Mosses are excellent indicators of lead from aerial sources since they only absorb minerals from precipitation and settled dust. Based on the data at present, airborne lead cannot be ignored as a hazard to crops. A protective mechanism in plants whereby large amounts of lead taken up by plant roots are immobilized by dictyosome vesicles and deposited in the cell wall appears to exist. A similar process may be operative throughout the plant. (Author abstract modified)

54582 **APTIC NO. 78690**

Zulfacar, Asadullah

VEGETATION AND URBAN ENVIRONMENT. *J. Urban Planning Develop. Div., 101(UP1):21-33, May 1975. 28 refs.*

The effectiveness of vegetation in reducing particulate and gaseous pollutants is summarized. Air cleaning by trees consists of the filtration process and settlement of particulates due to the reduction of wind velocity as the stream of the polluted air mass meets the resistance of the trees. Gardens and parks in the vicinity of industrial establishments lower the local atmospheric dust content by more than 40%. A 590 ft belt of vegetation reduces the dust count by as much as 75%. Deciduous trees are less effective than coniferous trees in reducing dust. The absorption rate of sulfur dioxide by vegetation is dependent on the concentrations of the pollutants. During the leaf bearing seasons the air in the vegetated clearance zones and parks contain 24.2% less sulfur in the form of oxides than the air in the nearby streets. Plants are capable of fixing and metabolizing SO2. A cubic meter of air polluted with 0.10 mg of SO2 is completely purified when the air passes through 2.5 acres of middle aged deciduous trees at a velocity of 15.5 mph. Decreases in the concentrations of SO2, hydrogen sulfide, and nitric oxide occur as the air passes through 1640 ft of vegetated sanitary buffer zones.

1974

54583 **APTIC NO. 78555**

Bartholic, J. F., L. H. Halsey, and R. H. Biggs

EFFECTS OF UV RADIATION ON AGRICULTURAL PRODUCTIVITY. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 498-504, 3 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

The effects of changes in ultraviolet (UV) irradiation on agricultural productivity were evaluated under field, growth chamber, and greenhouse conditions. The field test location was Gainesville, Florida, latitude 30 degrees north, where the UV flux density was expected to be greater during the spring than in areas further north. One check and two shelter treatments were used in the field studies. One shelter treatment used polyethylene, which has a minimal effect on the incoming radiation; the other used Mylar (type S) which filtered out UV radiation less than 320 nm. The treatments were replicated five times on corn, beans, and tomatoes. Environmental and plant measurements were taken. Fluorescent lights were used in both the greenhouse and growth chamber to enhance the UV irradiation. In the field experiment, although some statistically significant changes were observed in growth characteristics, the total yield produced in each treatment was generally only slightly altered. Some reduction in growth was observed for most plants in the greenhouse. Studies in the growth chamber showed a dramatic reduction in growth with UV exposure. There were higher levels of photosynthetically active radiation in the greenhouse, and more photorepair apparently occurred. (Author abstract modified)

54584 **APTIC NO. 78545**

Caldwell, M. M., W. F. Campbell, and W. B. Sisson

PLANT RESPONSE TO ELEVATED UV INTENSITIES. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 482-497, 18 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

Field and laboratory experiments were designed to test the response of plants to elevated intensities of global UV-B radiation (280 nm to 320 nm), such as those which occur if the amount of stratospheric ozone were reduced. Filter/lamp systems for supplementation of current solar ultraviolet irradiation under field conditions and for simulation of solar ultraviolet radiation under laboratory conditions are described. The growth, development, and productivity of agricultural and native plant species were tested under these enhanced ultraviolet radiation regimes. Ultraviolet supplementation caused significant inhibition of plant growth under greenhouse conditions. Profound changes in plant growth and productivity were not evidenced under field conditions, where one finds higher levels of longer- wavelength radiation which might be active in photoreactivation. However, under these field conditions more subtle yet important physiological processes were altered. Mutation rates of stamen hairs on a special test line of Tradescantia were significantly enhanced by the higher-ultratiolet-radiation regime. Also, ultrastructural modification of chloroplast membranes, as shown by electron microscopy, was also apparent in soybean leaves exposed to the enhanced UV radiation in the field. The capacity for tolerance and repair of damage caused by ultraviolet radiation at current-day levels may be sufficient iin some species of higher plants to resist the enhanced ultraviolet-radiation regime which would occur with stratospheric ozone depletion. However, through subtle though extremely important physiological alterations, other plants may be damaged by increased ultraviolet-radiation intensities. (Author abstract)

54585 **APTIC NO. 78553**

Cooper, Charles F., T. J. Blasing, H. C. Fritts, Freeman M. Smith, Jon Zich, and Wayne Stoner

SIMULATION MODELS OF THE EFFECTS OF CLIMATIC CHANGE ON NATURAL ECOSYSTEMS. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 550-563, 9 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

Five total ecosystem simulation models and a statistical model of climate and tree growth were operated with specified climatic changes. The simulation models predicted that primary plant production will decrease linearly with temperature decrease throughout the range of temperatures tested, except in extreme deserts where the effect is expected to be reversed. The predicted decrease is greatest in models of ecosystems more or less well supplied with water, and less or even reversed under moisture-stress conditions characteristic of shortgrass prairies, deserts, or the more arid coniferous forests. Climatic pertubation is predicted to have a nonlinear effect on consumer organisms that is more severe and less regular than the associated effect on primary producers. Rates, pathways, and the seasonal course of microbial decomposition are likely to be altered in relatively complex ways by climatic change; this could significantly influence long-term successional responses. The models suggest that total ecosystem standing crop may be either increased or decreased as a result of climatic change, depending in part on the initial climate and the successional status of the community being investigated. Water stress in vegetation is likely to be slightly reduced by a decrease in temperature even if that temperature decrease is accompanied by a reduction in precipitation. Interactions among climatic variables may generate responses whose signs differ from those which would be predicted from superposition of the independent effects of the several climatic forcing functions. (Author abstract)

54586 **APTIC NO. 78681**

Imai, S. and S. Sato

ON THE BLACK SPOTS OBSERVED IN THE INTEGUMENT OF SILKWORMS POISONED BY FLUORINE COMPOUNDS. *(Kaiko no fusso chudoku ni yoru byohan ni tsuite). Text in Japanese. Preprint, Japan. Society of Air Pollution, Tokyo, (9)2:401, 1974. (Presented at the Japan Society of Air Pollution, Annual Meeting, 15th, Fukushima, Japan, 1974.)*

The effect of fluorine compounds on mulberry leaves and silkworms were examined experimentally. Artificial foods containing 0, 10, 20, 40, 80, and 100 ppm of potassium fluoride were fed to fourth instar silkworms. While fluorine-free feed produced normal cocoons, the feed containing even 10 ppm of KF produced lighter and thinner cocoons, and feed containing 20 ppm of KF caused silkworms to die. At more than 80 ppm, all worms died at fourth or fifth instar with brownish black discolorations of the internodal integument, a characteristic symptom of fluorine intoxication. The body weight of the worm did not show any increase. The integument became very fragile; the black spots seen on fifth instar fluorine-intoxicated worms were due to the spotlike bleeding caused by broken integuments.

54587 **APTIC NO. 78608**

Kulagin, Y. Z.

GAS TOLERANCE OF PLANTS AND PREADAPTATION. *Sov. J. Ecol. (English translation from Russian of: Ekologiya), 4(2):128-131, Jan. 1974. 24 refs.*

It is expedient to interpret the gas tolerance of plants as their ability to grow and develop while being subjected to the effects of toxic gases, without a substantial decline in growth, life span, and reproduction. The following forms of gas tolerance may be distinguished: anatomical, physiological, biochemical, habitual, phenorhythmical, anabiotic, regenerative, populational, and phytocoenotic. The conclusion is reached that it is possible to predict and enhance the gas tolerance of plant species. (Author abstract modified)

54588 **APTIC NO. 78864**

Lux, Herbert

THE INFLUENCE OF ALKALINE INDUSTRIAL DUSTS ON THE SURFACE SOIL OF A PINE FOREST. *(Zur Beeinflussung des Oberbodens von Kiefernbestaenden durch basische Industriestaeube). Text in German. Wiss. Z. Tech. Univ., Dresden, 23(3/4):915-920, 1974. 16 refs.*

Soil biochemical and microbiological processes were studied in the topsoil of pine forests with considerable industrial dustfall (mainly calcia) from cement works and power plants and high sulfur dioxide concentrations in the Duebener Heide and at Ruedersdorf in East Germany. Both CaO and SO2 caused an increase in the number of species in the soil flora. The soil pH increased with decreasing distance from the dust emission source. Negative correlation was established between the pH value and the organic matter content. The increased lime content of the soil intensified the soil microbial activity and the carbon mineralization. This beneficial effect was counterbalanced by the effect of SO2 in the Duebener Heide.

54589 **APTIC NO. 78534**

Sakamoto, Clarence

EFFECT OF CLIMATE ON NON-DOMESTIC WHEAT PRODUCTION. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 539-549, 21 refs. (Feb. 26- March 1.)*

NTIS, DDC: AD A003846

The effects of historical climatic change on production of wheat and other crops are discussed. Reference is made to change in species distribution as affected by length of growing season, droughts, and temperature. The primary areas of study are Iraq and Iran, China, and Britain, although other areas of Europe and Asia are mentioned. The primary time periods studied are the period since 5000 B.C., the neolithic age, and that period known as the climatic optimum, a thermal maximum that occurred roughly during the period 5000 to 3000 B.C., when temperatures were as much as 2 to 3 C higher than today. (Author abstract modified)

1973

54590 **APTIC NO. 78673**

Bombace, M. A., L. Cigna Rossi, G. F. Clemente, G. Zuccaro Labellarte, M. Allegrini, E. Lanzola, and L. Gatti

ECOLOGICAL STUDY OF THE MERCURIFEROUS ZONES OF MONTE AMIATA. *(Ricerca ecologica sulle zone mercurifere del Monte Amiata). Text in Italian. Igiene Sanita Pubblica (Rome), 29(5-6):191-237, 1973. 38 refs.*

An extensive investigation was made of mercury pollution in one of the world's richest mercury-mining regions, the Monte Amiata area of southern Tuscany. Samples were taken from three rivers originating in the area: the Fiora, the Albegna and the Paglia. Also tested were samples taken from plant life (algae, mosses, grasses, mushrooms, etc.), raw foodstuffs, and prepared food. Investigation was made of the average daily diet of people living in the area (by interview method) and samples of human hair from a barber shop were analyzed. The highest concentrations in plants and river sediment were found in the valley of the Paglia. Especially strong evidence of pollution was noted in the community of Sforzesca, although this is farther (about 10 km) from the center of mining activities than the other high-Hg areas. In cereal grains the edible part of the grain is relatively Hg-poor, with higher concentrations in the bracts and glumes. Some wild grasses have concentrations as high as 100 ppm. The area does not contain any Hg-processing plants (only mining and metallurgy) and the agricultural yield of the area is low.

54591 **APTIC NO. 78589**

Chatigny, M. A., H. Wolochow, W. R. Lief, and J. Hebert

THE TOXICITY OF NITROGEN OXIDES FOR AN AIRBORNE MICROBE: EFFECTS OF RELATIVE HUMIDITY TEST PROCEDURES AND CONTAINMENT AND COMPOSITION OF SPRAY SUSPENSION. *Aerobiol. Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 94-97. 7 refs.*

The toxic effects of nitrogen oxides on airborne bacteria were investigated under various environmental conditions in stirred settling chambers. The toxic effect of nitrogen dioxide on airborne Flavobacterium was a function of NO2 concentration and relative humidity. At 80% relative humidity, NO2 toxicity was barely evident at 2-3 ppm but was significant at 10 ppm NO2. No loss of bacterial viability was apparent at 90 ppm NO2 when the relative humidity was decreased to 10%. Rinsing tests indicated that NO2 or a conversion product was adsorbed to the vessel walls and released slowly. The lethal effect of NO2 at 80% relative humidity was simulated by nitric acid or hydrogen chloride vapors at the same humidity. Increasing the buffer capacity of the spray suspensions appeared to minimize the toxicity of NO2, HNO3, and HCl. Thus, hydrogen ions appear to be implicated in the toxicity attributable to NO2. (Author summary modified)

54592 **APTIC NO. 78596**

Druett, H. A.

THE OPEN AIR FACTOR. *Aerobiol. Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp. Enschede, Netherlands, 1973 (?), p. 141-149. 34 refs.*

Airborne substances known collectively as the open air factor are discussed in relation to their bacteriacidal action and possible composition. The concentrations of such substances vary from one day to the next and are increased by meteorological conditions which limit upward mixing. The hypothesis that the open air factor arises from the mixing of olefin-containing urban air with general air masses containing ozone is consistent with the bacteriacidal action of laboratory ozone-le[illegible] products. Photochemically produced pollutants may also play a role in the open air factor. Such compounds are known to inhibit the formation of cell wall polysaccharide in plants and to quench the luminescence of Photobacterium phosphereum. Some viruses are also susceptible to the open air factor. (Author conclusions modified)

54593 **APTIC NO. 78593**

Mik, G. De and I. De Groot

THE SURVIVAL OF ESCHERICHIA COLI IN THE OPEN AIR IN DIFFERENT PARTS OF THE NETHERLANDS. *Aerobiol. Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 155-158. 5 refs.*

The survival of Escherichia coli on microthreads was measured along with ambient levels of several air pollutants at urban and rural sites throughout the Delft area of the Netherlands. The highest bacterial decay rates were measured in air passing over cities and industrial complexes, whereas the lowest decay rates were observed for air from rural areas. A correlation between bacteriacidal activity and ozone concentration was observed in contrast to a lack of association between bacteriacidal activity and concentrations of sulfur dioxide or nitrogen oxides. The findings support the suggestion that olefins and ozone are the principal contributors to a germicidal open air factor in the western part of the Netherlands.

54594 **APTIC NO. 78592**

Nash, T.

DETECTION OF PRESUMED OAF USING A NUCLEUS COUNTER. *Aerobiol., Airborne Transm. Airborne Infect., Proc. 6th Intern. Symp., Enschede, Netherlands, 1973 (?), p. 158-162. 5 refs.*

A method of detecting the presumed bacteriacidal open air factor associated with reacting mixtures of ozone and olefins was developed. The method employed the addition of sulfur dioxide to ozone-olefin mixtures followed by a nucleus count. Sulfur dioxide is known to reduce the bacteriacidal effect of such mixtures. A bacteriacidal effect, as measured by the viability of Coli 162 on microthreads, was not evident until the ozone concentration reached 0.4 pphm. Counts recorded in the chamber for a particular batch of outside air were then used as an index of the bacteriacidal activity of the air, given sufficient time to mature under free air conditions.

54595 **APTIC NO. 78493**

Stemple, Ronald B. and Earl H. Tryon

EFFECT OF COAL SMOKE AND RESULTING FLY ASH ON SITE QUALITY AND RADIAL INCREMENT OF WHITE OAK. *Castanea, 38(4):396-406, 1973. 11 refs.*

The effect of sulfur dioxide and fly ash emissions from coal-burning locomotives on the productivity of a northern West Virginia slope supporting a white oak stand was investigated in terms of site quality and annual ring width. Fly ash depths exceeded 1 ft on the lower portion of the slope which was located near the railroad tracks. The site quality of the land adjacent the railroad was drastically reduced, with damaged areas averaging over 30 site quality index points lower than undamaged areas. The annual smoke pollution showed a strong negative correlation with tree ring width. The relative importance of fly ash depth and smoke intensity in depressing tree growth was not assessed. (Author abstract modified)

54596 **APTIC NO. 78580**

Forest Service

AIR POLLUTION DAMAGES TREES. (SPECIAL REPORT). *USFS Rept. 1973, 32p., 1973. 37 refs.*

Sulfur dioxide and ozone are probably the most important phytotoxic air pollutants in the northeast. Fluorides, chiefly in the form of the gas hydrogen fluoride, also occur. Injury on conifer needles from all these pollutants is often manifested as necrosis of the needle tip or the entire needle. Ozone also causes a chlorotic mottle of needles. Most pollutants cause more specific symptoms on broadleaved trees. Sulfur dioxide symptoms generally appear on broadleaved trees as an interveinal necrosis, the injured tissue being a light brown. Ozone causes a reddish-purple stipple or brown to white fleck of the upper leaf surface. Fluoride injury is usually restricted to the margins of the leaf, where toxic accumulations of this pollutant cause the tissues to turn brown and die. Minor pollutants cause a variety of symptoms. The pollutants discussed include ethylene, oxides of nitrogen, ammonia, chlorine, hydrogen chloride, and particulates. Air pollution injury to trees is most prevalent during inversions. Caution should be exercised in the field when diagnosing air pollution injury as it is often confused with injury caused by many other factors. (Author abstract modified)

EFFECTS-MATERIALS

1975

54597 **APTIC NO. 78727**

Auxel, Harry and Walter Weiss

MEASURING EQUIPMENT FOR DETERMINING THE RISK OF LOCAL POLLUTION LAYERS OF H.V. INSULATORS. *Siemens Rev., 42(1):20-25, Jan. 1975. 8 refs.*

A method for measuring the extent of conductive surface pollution layers on high voltage insulators as a result of particles deposition in combination with moisture is described. A test voltage of 3000 volts is used. A timer switches on the voltage across the insulator every 2 min for 0.5 sec. The presence of a moist pollution layer on the test insulator causes a current to flow over it, resulting in a voltage across a test resistor. A 50 Hertz bandpass filter is used to prevent the flow of high-frequency currents which can occur as a result of sparks across the insulator. Responses to the test voltage by the insulator are monitored on a line recorder.

54598 **APTIC NO. 78977**

Goldenberg, Nathan and Harry R. Matheson

OFF-FLAVOURS IN FOODS, A SUMMARY OF EXPERIENCE: 1948-74. *Chem. Ind. (London), no. 13:551-557, July 5, 1975. 26 refs.*

Food products returned by customers because of the off flavors were examined to identify the cause of the problem. Off flavors occurred in baked goods produced during episodes of odor pollution near the bakery from nearby herbicide factories. A procedure was devised by which ventilation fans were not used during these episodes. Off flavors are also caused by absorption of the volatile components of paints. A Code of Practice on Food Quality Paints was developed which recommends particular paints to be used in relation to conditions in food factories. Off flavors are also caused by water-borne contamination, packaging materials, disinfectants, pesticides, detergents, microbial spoilage, and enzymatic and oxidative spoilage.

54599 **APTIC NO. 78418**

Legault, R. A. and A. G. Preban

KINETICS OF THE ATMOSPHERIC CORROSION OF LOW-ALLOY STEELS IN AN INDUSTRIAL ENVIRONMENT. *Corrosion, 31(4):117-122, April 1975. 1 ref.*

The natural atmospheric corrosion behavior of low alloy steels in industrial environments is described by an equation of the form: delta W equals Kt to the Nth power. Reliable predictions of long term behavior are possible. A vehicle is provided for accurately assessing the effect on atmospheric corrosion behavior alloying additions, processing variables, and differences in exposure environment. (Author abstract modified)

EFFECTS-ECONOMIC

1975

54600 **APTIC NO. 78477**

Miyamoto, T.

EVALUATION OF ECONOMIC LOSS CAUSED BY ENVIRONMENTAL POLLUTION. *(Kogai ni yoru keizaiteki sonshitsu hyoka). Text in Japanese. Kankyo Kenkyu (Environ. Res.), no. 10:50-57, Aug. 1975.*

Economic losses due to various kinds of pollution (air, water, noise, vibration, subsidence) were surveyed from 1970 to 1973 in the Eto delta region of metropolitan Tokyo. The area is bounded by Sumida River, Ara River, and faces Tokyo Bay. Medium and small-sized factories and residences are located next to each other, and a network of medium and small rivers exists in the area. The region covers 47.1 sq km (2.2% of total area of metropolitan Tokyo); has a population of 671,000; and 235,000 households. Only amounts of money actually spent as a result of pollution were tabulated and used in further calculations. In 1972, a total of $27.8 million was spent on public works projects as a result of pollution, of which about $27 million were spent on remedying effects of subsidence (land sinking). Of the remainder, pollution-caused expenditures were divided as follows: water, $340,000; air, $253,000; and noise and vibration, $97,000. From a survey of some 3700 businesses, annual economic losses from air pollution amounted to $5.3 million, of which $3.3 million were spent on remedying effects of corrosion and rusting. A total of 2900 households were surveyed through questionnaires sent home through elementary schools, and from records kept of household expenses. One out of five households had experienced some form of pollution-caused illnesses. Annual pollution-caused expenditures were as follows: air pollution (laundry, home repairs and remodeling, purchase of equipment to counteract pollution), $5.8 million; medical, $4.85 million; recreational (to get away from pollution), $8.6 million. Among households where pollution- caused illnesses were present, 42.9% had budgets ending in the red, compared to 15.5% of households without illnesses. Graphs, tables are included.

54601 **APTIC NO. 78867**

Oppenlaender, Karl Heinrich

EXPENDITURES FOR THE PROTECTION OF THE ENVIRONMENT BY INDUSTRY. *(Umweltschutzaufwendungen in der Industrie). Text in German. Metall (Berlin), 29(4):389-391, 1975.*

The principal results of a survey conducted among 2000 companies representing industries other than the ferrous metallurgy and chemical industry between 1971 and 1973 in West Germany are presented. The environmental protection-related investments during this period amount to $1,330,000,000, corresponding to 0.3% of the annual turnover. The specific investment amounted to 0.7% in the raw materials and in the producer goods-manufacturing industries. Most of the capital was invested for the prevention or abatement of environmental pollution from industrial facilities, while investments dictated by environmental legislation concerning the distribution and utilization of industrial products accounted for 0.01% of the turnover. About 55% of the invested capital was used for air pollution control measures. The nonferrous metallurgical industry invested $80,000,000 for production- related environmental protection, including 80% for the control of gaseous and particulate emissions. Small companies with 200 to 999 employees were affected by the necessary investments to a greater degree than large companies, which, together with the expected further increase of the investments in this area, may well lead to a progressive centralization of industry at the expense of small plants with high specific emissions.

54602 **APTIC NO. 78961**

Rose, Adam

THE COST OF STACK GAS CLEANING IN NEW YORK STATE. *J. Air Pollution Control Assoc., 25(10):1005-1008, Oct. 1975. 10 refs.*

A cost estimating methodology was applied to an emission point inventory to estimate the capital and operating costs of stack gas cleaning in the manufacturing sector of New York State. Costs were estimated on a source by source basis. The various control cost components are presented for twenty manufacturing industry groups. The estimates may be used in an abatement planning model to determine the least cost strategy to meet a given environmental standard and the overall economic repercussions of the standard. (Author abstract modified)

1974

54603 **APTIC NO. 78539**

Crocker, Thomas D. and Terry A. Ferrar

CLIMATIC PERTURBATIONS AND URBAN ECONOMIES. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 593-611. 5 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD A003846

The economic consequences for urban places of the climatic perturbations likely to be associated with increased flight in the stratosphere are assessed. Variations in incomes, property values, and public and private expenditures are modeled as dependent upon such climatic attributes as precipitation, temperature, and ventilation. The results of an attempt to assess the implications of climatic changes for the structure and location of urban places, in particular with respect to the movement of the urban centers within the corn belt, are also presented. The theory associated with each method of cost evaluation is considered. Some attention is devoted to the problem of aggregating the estimates established with the three approaches. (Author abstract modified)

54604 **APTIC NO. 78535**

D Arge, Ralph C.

ECONOMIC IMPACT OF CLIMATIC CHANGE: INTRODUCTION AND OVERVIEW. *Dept. of Transportation, Washington, D. C., Climat. Impact Assess. Conf., 3rd, Cambridge, Mass., 1974, p. 564-572. 4 refs. (Feb. 26-March 1.)*

NTIS, DDC: AD 003846

The stratosphere is conceptualized as being an asset of the earth s population in a cost/benefit analysis. Filtering of ultraviolet light and regulation of global climatic profiles are included in the services provided by the stratosphere. If provision of other services, such as air travel, alters the quality of the services now provided by this asset, the major question is how to value the services so as to impute a value to the change in them. A review of existing methodologies for attaching such a value where no market exists is undertaken. A brief examination is also made of asset utilization when the probabilities of effects of alternative uses are not known, but there are hunches that the effects of certain uses may yield very high negative or positive returns. (Author abstract)

STANDARDS AND CRITERIA

1975

54605 **APTIC NO. 78880**

Giese, H. J.

INCINERATORS FOR MEDICAL WASTES. *(Verbrennungsanlagen fuer Medizinabfaelle). Text in German. Wasser Luft Betrieb, 19(4):171-174, 1975.*

General hygienic and environmental requirements imposed on incinerators for medical wastes in West Germany are outlined. Medical wastes must be incinerated without any infection hazards for the incinerator personnel and for the environment. Wastes from hospital wards of infectious diseases have to be sterilized before incineration. The temperature of the afterburning chamber of the waste incinerator must be at least 800 C. Cyclones and wet type dust separators are best for incinerator flue gas cleaning. At a flue gas oxygen content of 17%, the dust concentration is limited to 100 mg/N cu m. The hydrochloric acid and hydrofluoric acid emissions are limited to 6 kg/hr and 0.2 kg/hr, respectively, which values are generally not exceeded in incinerators with throughput capacities of up to 750 kg/hr.

54606 **APTIC NO. 78447**

Hettche, Otto

ON THE PROBLEM OF AN IMMISSION LIMIT VALUE FOR BENZO(A)PYRENE. *(Zum Problem eines Immissions-Grenzwertes fuer Benzo(a)pyrene). Text in German. Forum Umwelthygiene, 1(2-3):46-50, 1975. 29 refs.*

Ambient concentrations of polycyclic aromatic hydrocarbons (PAH) have been measured for the last 25 yr. Data for benzo(a)pyrene and other carcinogenic compounds for several cities and industrial districts in western Germany are presented. Smaller quantities of hydrocarbons cannot be measured by high-volume filtration samplers but by collecting the atmospheric particulate matter in the surfaces of plants. Results of pathological investigations correlate with those of the epidemiology of lung cancer in a district with 5 million inhabitants, where 15,000 deaths due to lung cancer occurring from 1960-1968 were evaluated.

54607 **APTIC NO. 78763**

Inhaber, N.

A SET OF SUGGESTED AIR QUALITY INDICES FOR CANADA. *Atmos. Environ., 9(3):353-364, March 1975. 16 refs.*

An approach to producing air quality indices over a wide area is discussed. Three types of indices are produced: index of specific pollutants (sulfur dioxide, suspended particulates, carbon monoxide, nitrogen oxides, and total oxidants); index of industrial emissions; and index of inter-urban air quality. The proposed indices cover aspects of pollution in cities, around cities, and in rural areas. Data are shown on a local and regional basis in Canada, and the production of national indices is attempted. Detailed evaluation is difficult because of lack of comprehensive data. (Author abstract modified)

54608 **APTIC NO. 78877**

Kohayagawa, T.

AIR QUALITY STANDARD OF NOX. *(NOx no kankyo kijun). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 29(8):759-766, Aug. 1975. 5 refs.*

Nitrogen dioxide concentration higher than 0.06 ppm/yr caused an increase of periodical occurrence of respiratory diseases and reduced the lung capacity of children. The threshold values of NO2 exposure were 0.20-0.34 ppm/hr (375-630 microgram/cu m). An environmental standard of 0.02 ppm as 24-hour average was set by the Japanese Government. The NO2 was analyzed by JIS B7953-1974 method which utilized continuous automatic apparatus using Saltzman method. The method has low sensitivity at such a low concentration and new apparatus using chemiluminescence method were developed. The average NOx concentration in Tokyo, which is the most polluted city in Japan, is only about 1/7 of the concentration in Los Angeles. The environmental standard of nitric oxide has not been established.

54609 **APTIC NO. 78960**

McMullen, Thomas B.

INTERPRETING THE EIGHT-HOUR NATIONAL AMBIENT AIR QUALITY STANDARD FOR CARBON MONOXIDE. *J. Air Pollution Control Assoc., 25(10):1009-1014, Oct. 1975. 3 refs.*

There are two principal approaches to the 8 hr carbon monoxide standard: 8 hr moving averages that culminate with every clock hr, and nonoverlapping averages for consecutive 8 hr intervals. Examination of 1972 data for example sites in Newark, New Jersey; Camden, New Jersey; and Spokane, Washington shows that the maximum and the second highest control values derived from moving averages can be at least 20% higher than corresponding values detected by the consecutive 8 hr intervals. The natural fluctuation in the time of day when the maximum occurs and the variability in episode length make it doubtful than any framework of consecutive 8 hr intervals can adequately portray the essential characteristics of CO exposure. The moving interval 8 hr average approach is the method of choice because it is more sensitive to actual maximum levels and to short episodes, more faithful to the body s integrating response to CO exposure, and more equitable in presenting comparisons among stations with differing patterns of daily variation. (Author abstract modified)

1973

54610 **APTIC NO. 78882**

Mammarella, L.

CRITERIA FOR THE DEFINITION OF TOP CONCENTRATION VALUES FOR AIR CARRIED DUSTS. *(Criteri per la definizione di valore limiti di concentrazione per polveri aero diffuse). Text in Italian. Ann. dell Ist. Super. Sanita (Rome), 9(1):460-465, 1973. 6 refs.*

Evaluation criteria for air-carried dusts are derived from the average correspondences between a weighted dust sample and a differential dust sample. Criteria that give priority to health concerns, that specifically identify the type of atmosphere under consideration (open or confined), and that distinguish the sedimentation-prone air-diffused component from harmless materials are needed. Fine dust ground-level pollution should be distinguished from materials like soot. Concentration standards for aerosols derived solely from weight sampling may not allow accurate assessment of health hazards. Weight sampling results are affected by coarser, heavier particles that may pose no real health danger; in other atmospheres, with weight-readings within the norm, there may be hazardous concentrations of minute aerosols. The weight/granulometry ratio tends to vary from area to area, and to vary within the same area by season, day, and hour. In formulating standards, the type of atmosphere and the nature and granulometry of the dust particles must be considered.

1972

54611 **APTIC NO. 78482**

EMISSION STANDARDS FOR AIR POLLUTION CONTROL. PART I: INDUSTRY (CLASSIFIED ESTABLISHMENTS: L. 1917-1964). *(Prescriptions imposees pour lutter contre la pollution atmospherique I - Industrie (etablissements classes: L. 1917-1964)). Text in French. Paris Univ. (France), Centre d Etudes et de Recherches sur le Droit et l Economie de l Environnement and Strasbourg Univ. (France), Inst. de Recherches Juridiques, Politiques, et Sociales, Aspects Juridiques lutte pollut. air, Table Ronde, Strasbourg, France, 1972, 7p., 1972. (March 10-11.)*

Air pollutant emission standards imposed on classified industries, domestic heating installations, and motor vehicles in France are listed. For industrial combustion equipment and cement works, the stack heights are calculated as a function of capacity, rate of discharge, pollutant concentration, temperature difference between the flue gas and the ambient air, and the presence of nearby obstacles. The maximum allowable dust concentration is set at 0.15 mg/cu m around industrial stacks, and at 0.06 mg/cu m around cement works. The use of fat coal, peat, lignite, moist wood, heavy fuel oil, and distillate oil is prohibited in certain small-capacity domestic heating equipment in specific protection ozones in Paris. Carbon monoxide and hydrocarbon emission standards have been imposed on automobiles as a function of weight, as well as trucks and diesel engine- powered vehicles. The CO emission is limited to 4.5% at idling speeds and the crankcase emission must not exceed 0.15% of the fuel consumption.

LEGAL AND ADMINISTRATIVE

1975

54612 **APTIC NO. 78619**

Bracken, Thomas B. and Edward I. Selig

AIR QUALITY MAINTENANCE AND LAND USE IMPLICATIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-06.5.)*

The implementation of land use and transportation control plans for the maintenance of ambient air quality standards is discussed. Such controls primarily restrict the use of automobiles in urban areas. A review of various court decisions indicates that regulations for pre-construction review of new indirect sources such as parking facilities and highways issued by the Environmental Protection Agency may present technically and judicially unmanageable standards for review. The EPA recognizes that a workable plan for air quality maintenance involves a land use plan of comprehensive scope, and the agency requires states to submit overall plans for areas where expected development over the next 10 yr may cause air quality standards to be exceeded. Such plans include mass transportation as an alternative to the automobile and considerations of trade-offs among different environmental interests. The need to reconcile environmental protection with other social and economic objectives is going to require policy coordination at all government levels. (Author abstract modified)

54613 **APTIC NO. 78723**

Buck, Manfred

THREE MEASUREMENT GRIDS SIMULTANEOUSLY. *(Drei Messnetze uebereinander). Text in German. Umwelt (Duesseldorf), vol. 3:50-53, June 1975. 2 refs.*

Three hierarchic air pollution monitoring networks, a combination of stationary and mobile sampling stations, are used in Northrhine-Westfalia for the measurement of the background concentrations, for smog alerts and for the determination of the results of air pollution control measures taken. Sulfur dioxide, dustfall, total organic carbon, nitrogen dioxide, fluorine compounds, and suspended particulate matter are measured in a mobile network at 4000 sampling sites. This network serves mainly for the determination of the background concentrations. Partly automated measurements of airborne particulates and heavy metals are carried out at 71 stationary sampling stations spaced at 7 km from each other. A fully automatic, telemetric, realltime system of 15 stations is used to obtain pollution data for smog alerts. The pollution data obtained are used to elucidate relationships between pollution events and the activity of certain emission sources, and for the publication of updated pollution inventories.

54614 **APTIC NO. 78633**

Covington, Frank M.

IMPLEMENTATION PLANS: CALIFORNIA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(60):13520, March 27, 1975.*

Thirty-seven compliance schedules were submitted by California as revisions to the approved state implementation plan for air quality standards. Each proposed compliance schedule revision establishes a new date by which an individual air pollution source must comply with an emission limitation specified by the implementation plan. Ten of the schedules have expired and the affected sources are now required to be in compliance with the applicable air pollution control regulations. It is proposed that the remaining 27 schedules be approved.

54615 **APTIC NO. 78432**

Drosdat, Herbert and Thomas Kuehn

THE TECHNOLOGIST AND PUBLIC POLICY. *Chem. Technol., vol. 1975: 290-294, May 1975. 2 refs.*

Methods to minimize the private automobile contribution to air pollution in the state of Washington are proposed. They include: provision for an annual state emission and safety inspection which would complement a state motor vehicle law which says, in part, the engine and power mechanism of every motor vehicle shall be so equipped and adjusted as to prevent the escape of excessive fumes of smoke; institution of a tax on either the initial or the annual vehicle registration to provide funds for the annual inspection and enforcement of the visible exhaust law and for associated air pollution abatement programs; and increasing public awareness tax of the automobile s contribution to air pollution and possible health hazards.

54616 **APTIC NO. 78662**

Ecke, H. O. G. and F. J. Dreyhaupt

ENVIRONMENTAL PROTECTION POLICY AND MEASURES TO REDUCE HYDROCARBON EMISSIONS FROM OIL REFINERIES. *Preprint, World Petroleum Congress, Japanese Organizing Committee, Tokyo, 13p., 1975. 3 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, 1975.)*

The legislation for environmental protection now in force in the Federal Republic of Germany and the measures being taken to limit hydrocarbon emissions are discussed. A draft regulation under discussion in the Federal State of North Rhine-Westphalia is reported. Legal regulations and technical procedures used to judge the impact of hydrocarbon emissions by an oil refinery on the environment are described. Based on a survey of all hydrocarbon emission sources of a refinery, the fraction of the immission level caused by the refinery to the neighborhood can be predicted by means of propagation calculations. The significance of the refinery s emissions can be judged by comparison of measured and calculated immission values. The conditions which have to be fulfilled to obtain an operating permit from the authorities can then be formulated. The effect of new regulations on the construction of refineries is indicated and the need for authorities and governments to ensure in their long term planning the availability of suitable sites for future developments within reasonable distance of markets and labor force is stressed. (Author abstract modified)

54617 **APTIC NO. 78840**

Ferrar, Terry A. and Alan B Brownstein

VARIANCE DESIGN AND AIR POLLUTION CONTROL. *J. Air Pollution Control Assoc., 25(6):602-604, June 1975.*

Confronted with shortages of low sulfur content residual fuel oil, several air pollution control authorities in the Northeastern states were forced to relax air quality standards during the winter of 1972. The authorities did so by granting variances to their sulfur content standards for residual fuel oil. The variance strategies employed in the states surrounding New York attached major importance to administrative discretion. While these procedures operated satisfactorily as a crisis measure, contingency designs based on these short run results are not recommended. Design criteria were developed for evaluation of variance policies. New York City s generalized variance and financial surcharge approach demonstrated institutional characteristics that recommend it for consideration in future periods of fuel oil shortage. (Author abstract modified)

54618 **APTIC NO. 78722**

Fridrich, Bernd-Dieter

GOVERNMENT DEFENDS GASOLINE-LEAD-ACT. *(Regierung verteidigt Benzin-Blei-Gasetz). Text in German. Umwelt (Duesseldorf), vol. 3:10-11, June 1975.*

Pros and cons concerning low-lead gasoline are discussed in connection with the planned introduction, on January 1, 1976, of the second step of the Gasoline Lead Act in West Germany, implying a reduction of the lead content to 0.15 g/liter. The increased costs of low-lead gasoline production are planned to be compensated by a surcharge on gasoline with higher lead level. The changeover to low-lead gasoline will require minor modifications and adjustments in certain makes and models of automobiles. Arguments claiming increased fuel consumption, reduced service life of the motor, and increased emissions of carcinogenic hydrocarbons as a result of reduced gasoline lead level are regarded as unjustified by the Federal Ministry of the Interior.

54619 **APTIC NO. 78437**

Halton, Charles C.

TRANSPORT POLLUTION...THE IMPACT OF TRANSPORT ON THE ENVIRONMENT. *SAE-Australasia, vol. 1975:18-27, Jan.-Feb. 1975. (Presented at the National Convention, 6th, Nov. 1974, Paper 11.)*

Legislation for the control of motor vehicle emissions in Australia are reviewed. Three anti-pollution measures are in effect. On regulation limits the carbon monoxide content of exhaust gases at idling in all cars manufactured since Jan. 1, 1972 to 4.5% by volume. Another rule limits emissions of hydrocarbons and CO during a cycle consisting of various operating modes such as acceleration, deceleration, and steady speed. The latest rule specifies limits for total emissions of oxides of nitrogen as well as CO and hydrocarbons. Currently the Australian average lead content is about 0.6 g/l, but from some refineries it may be as high as 0.75 for super grade gasoline. Tests on Pb filter prototypes demonstrate they are effective and can remove 70% to 90% of the Pb from the exhaust gases in the first 25,000 miles.

54620 **APTIC NO. 78664**

Jimeson, Robert M.

ELEMENTS OF AN ADEQUATE ENVIRONMENTAL IMPACT STATEMENT FOR THE PETROLEUM, PETROCHEMICAL AND BULK ENERGY INDUSTRIES. *Preprint, World Petroleum Congress, Japanese Organizing Committee, Tokyo, 6p., 1975. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, 1975.)*

The National Environmental Policy Act requires that an environmental impact statement be prepared before any major Federal action is undertaken. Government agencies which grant licenses, permits, or funds for private developments have prepared an environmental report to be supplied along with the application for a license. The reports are expected to contain a description of the systematic procedure used to select the proposed action, starting with the broadcast feasible objectives of the action and progressively narrowing the alternatives. First, general background information concerning the project is delineated. Second, information is gathered which describes the present ambient quality of the environment and permits a likely forecast of its future. Third, the emissions from the facility are translated into changes in the ambient quality of the land, air, and water at the proposed or alternative site or sites. The emerging policy trends are presented as they related to the petroleum, petrochemical, and bulk energy industries. (Author abstract modified)

54621 **APTIC NO. 78620**

Kincannon, Benjamin F.

ECONOMIC CONSIDERATIONS IN AIR QUALITY MAINTENANCE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 10p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75- 06.4.)*

Factors affecting the economic impact of various air quality maintenance measures are discussed. The type and magnitude of the economic impacts of maintenance measures depend on the public policy options chosen to implement the measures and the unique features of the measures themselves. In terms of policy alternatives, taxes, where applicable, are preferable to direct controls. Where direct regulation is the only option, care must be taken to simplify the reporting and monitoring process in order to limit administrative costs. Adverse economic effects of a given maintenance measure are lessened when flexibility is a prominent feature of its implementation. Measures with definitive areas of control tend to impact fewer aspects of a given community's economy. Reference is made to the Denver Air Quality Maintenance Plan as an example of the types of impacts covered by maintenance plans. (Author abstract modified)

54622 **APTIC NO. 78842**

Kolm, Serge-Christophe

QUALITATIVE EFFICIENCY AND OPTIMAL FINANCING OF ENVIRONMENTAL POLICIES. *(Rendement qualitatif et financement optimal des politiques d environnement). Text in French. Econometrica, 43(1):93-113, Jan. 1975. 31 refs.*

Many environment policies use two categories of instruments: a financial incentive, most often a tax for polluters, and direct undertakings or financing of some restoration, maintenance, or improvement of environmental quality. The financial consequences of such policies, are important for considerations of public finance, decentralization, and equity. They turn out essentially to depend upon the mathematical structure of, first, the environment function, and, second, the various constraints of the problem. Constraints which can be expressed by homogeneous functions of any degree are shown to have no direct financial effect. Apart from the constraint's effects, budgetary equilibrium, surplus, and deficit are given by environment functions which present constant, decreasing, or increasing qualitative returns to scale, respectively. The opposite case of cleaning and dilution types of improvement technology is presented, with some other mixed simple cases and a few applications of the results. (Author abstract)

54623 **APTIC NO. 78856**

McGlennon, John A. S.

COMMONWEALTH OF MASSACHUSETTS. APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. *Federal Register, 40(39):8228, Feb. 26, 1975.*

An amendment to the state implementation plan of the commonwealth of Massachusetts regarding the granting of variances is presented. The proposed change would list specific criteria which must be met by the applicant before the variance could be granted for the period prescribed by the Federal law. The amended variance regulation requires the applicant to have made good faith efforts to comply with the regulations prior to the variance petition. Public comment is invited.

54624 **APTIC NO. 78631**

Menko, Joseph M.

STATE OF DELAWARE. AIR QUALITY IMPLEMENTATION PLAN; PROPOSED REVISIONS. *Federal Register, 40(62):14340, March 31, 1975.*

Proposed amendments to the Delaware State Implementation Plan for the attainment and maintenance of national ambient air quality standards were submitted to the Environmental Protection Agency. The changes consist of major additions to the regulation on registration and permits for complex sources, a new regulation for control of odorous emissions, deletion of the regulation on dumps or sanitary landfill, revisions necessitated by changes to the state enabling legislation, and changes in wording and intent to eliminate ambiguity, conform with current EPA regulations, or conform with related state regulations.

54625 **APTIC NO. 78832**

Meyers, Sheldon

ENVIRONMENTAL IMPACT STATEMENTS. AVAILABILITY OF REVIEW COMMENTS. *Federal Register, 40(82):18489-18493, April 28, 1975.*

The availability of comments of the Environmental Protection Agency on Federal agency actions impacting the environment is announced. Appendix I contains a listing of draft environmental impact statements; Appendix II contains definitions of the classification; Appendix III contains a listing of final environmental impact statements; Appendix IV contains a listing of final environmental impact statements reviewed, but not commented upon; Appendix V contains a listing of proposed Federal agency regulations, legislation proposed by Federal agenices, and other proposed actions. Appendices I, III, IV, and V also contain listings of the Federal agency responsible for the statement, the number and title of the statement, and the classification of the nature of the comments.

54626 **APTIC NO. 78818**

Morris, A. R.

PENNSYLVANIA IMPLEMENTATION PLAN. PROPOSED REVISION. *Federal Register, 40(51):11894-11895, March 14, 1975.*

A proposed revision to the Pennsylvania Implementation Plan is presented. The revision would incorporate a process factor of 50 lb/ton of fill for pressed, blown, and spun glass melting furnaces. The current emission standard, which is based on grain loading requirements, is overly restrictive and should be relaxed. In most cases, the furnaces are located in areas where the primary ambient air quality standards are being met. Emission reductions achieved by process modification are significant. Satisfactory air pollution control equipment is expensive and would lead to a price increase of the industry's product that the market areas for this product would not support. Public comment is invited.

54627 **APTIC NO. 78785**

Mullins, Vincent J.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. PROPOSED REVISION TO THE COMMONWEALTH OF PUERTO RICO IMPLEMENTATION PLAN. *Federal Register, 40(47):10997-10999, March 10, 1975.*

A proposed revision to the Commonwealth of Puerto Rico Implementation Plan is announced. The control strategy for sulfur oxides contained in the revision proposes to maintain national ambient air quality standards by assigning a maximum allowable sulfur content to each source such that the resulting ambient air quality concentrations predicted by means of the specified dispersion model are below national ambient air quality standards. Meteorological input for short term calculations consists of wind speed, wind direction, and atmospheric stability measured at 5-minute intervals at wind meteorological towers located at several sites around Puerto Rico. Significant terrain features are considered by subtracting from the effective stack height of the source one half of the difference in height between the base of the stack and the elevation of the terrain at which a prediction of concentration is being made.

54628 **APTIC NO. 78900**

Nonhebel, G.

BEST PRACTICABLE MEANS AND PRESUMPTIVE LIMITS: BRITISH DEFINITIONS. *Atmos. Environ., 9(8):709-715, Aug. 1975. 23 refs.*

The British terms best practicable means and presumptive limits are defined in relation to the control of industrial air pollution emissions. Best practicable means is a comprehensive method used in British legislation for the control of gaseous and particulate air pollutants. The term refers to the provision and efficient maintenance of equipment for preventing air pollution as well as to the operation and supervision of such devices. The control measures must be reasonably practicable in terms of local conditions and circumstances, financial implications, and the current state of technical knowledge. Chief inspectors establish their own emission standards known as presumptive standards to apply the requirements of best practicable means. Facilities which do not meet these standards are presumed not to be using best practicable means.

54629 **APTIC NO. 78902**

Pitts, J. N., Jr., A. C. Lloyd, and J. L. Sprung

ECOLOGY, ENERGY AND ECONOMICS. *Chem. Brit., 11(7):247-256, July 1975. 84 refs.*

The role of research in establishing cost-effective programs of air pollution control is discussed, with particular reference being made to the photochemical smog problem. Topics covered include: The mechanism of photochemical smog formation, studies of the quantitative relationship between ambient air quality and emission control, the selection of cost- effective control strategies, the effect of air pollution control on the energy crisis, the use of reaction rate constants and reaction intermediate data to define the chemical and physical transformations which control photochemical smog formation, smog chamber experiments designed to validate smog reaction mechanisms, and computer modeling techniques for simulating smog formation in urban areas.

54630 **APTIC NO. 78632**

Quarles, John

GEORGIA: PERMIT SYSTEM REGULATIONS. *Federal Register, 40(60):13498-13499, March 27, 1975.*

The Clean Air Act requires each state implementation plan to include a procedure for reviewing, prior to construction or modification, any source to which performance standards apply in order to determine whether such construction or modification might be expected to cause a violation of any standard. As revised, the Georgia regulations require an operating permit of any source of air contaminant emissions, whereas the previous regulation required this only of new or modified sources, for which a construction permit had been obtained. Sources affected by the new requirements can continue to operate until the State acts on their application for an operating permit. There is now no set deadline for the state s action as in the original regulation. Provision is made in the new regulation for delayed submittal of supporting information, formerly required at the time of application. Operating permits now contain specific conditions designed to assure compliance with applicable state regulations and statutes, and sources can now be required to monitor and report operations as well as conduct the performance tests previously required. The state can now grant temporary operating permits in cases where time was needed to correct deficiencies in an existing facility; in such cases, the permit would contain a specific schedule for compliance within the shortest practical time period. The amended section on Revocation of Permits provides for the periodic review and possible modification of permits already issued. The revisions are approved. Two comments in response to the proposal of the revisions are discussed.

54631 **APTIC NO. 78634**

Quarles, John

KENTUCKY: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(61):14070-14074, March 28, 1975.*

The Clean Air act requires each state to submit a plan which provides for the attainment and maintenance of the national ambient air quality standards throughout the state. Each such plan is to contain legally enforceable compliance schedules. Several compliance schedules submitted by Kentucky are approved. Each schedule establishes a date by which an individual air pollution source must attain compliance with the emission limitations of the state implementation plan.

54632 **APTIC NO. 78651**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. CALIFORNIA: APPROVAL AND DISAPPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(61):14069-14070, March 28, 1975.*

The Environmental Protection Agency gives notice of its approval of 13 compliance schedules and disapproval of two compliance schedules relating to air pollution sources in the state of California. Each compliance schedule establishes a new date by which the individual air pollution source must comply with the applicable air pollution control regulations. The schedules include incremental steps towards compliance with the specified regulations. Disapproval of two of the schedules is due to the fact that the final compliance date in each schedule extends beyond the allowable attainment date. A copy of the complete California State Implementation Plan and an evaluation report setting forth EPA s position on each of the schedules are available for public inspection.

54633 **APTIC NO. 78858**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. NORTH CAROLINA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(61):14074-14083, March 28, 1975.*

The approval of revised compliance schedules for the state of North Carolina is announced. Each schedule established a date by which an individual air pollution source must attain compliance with the emission limitations of the state implementation plan. Many schedules include incremental steps toward compliance with specific dates set for achieving those steps. All schedules satisfy the requirements of 40 Code of Federal Regulations Part 51 pertaining to plan revisions and compliance schedules. Approval does not hinder the attainment and maintenance of the national ambient air quality standards.

54634 **APTIC NO. 78859**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. GEORGIA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(82): 18430-18431, April 28, 1975.*

The approval of compliance schedules for the state of Georgia is announced. Each schedule establishes a date by which an individual air pollution source must attain compliance with the emission limitations of the state implementation plan. Many schedules include incremental steps toward compliance with specific dates set for achieving those steps. All schedules satisfy the requirements of 40 Code of Federal Regulations Part 51 pertaining to plan revisions and compliance schedules. Their approval does not hinder the attainment and maintenance of the national ambient air quality standards.

54635 **APTIC NO. 78406**

Smith, C. V., Jr.

IDAHO. AIR QUALITY IMPLEMENTATION PLAN: PROPOSED REVISIONS. *Federal Register, 40(70):16218-16219, April 10, 1975.*

Proposed revisions to the air quality implementation plan of Idaho are presented. The changes include amended regulations C and A and a revised Regulation S, control of sulfur dioxide emissions. Regulation C is amended to maintain consistency with the Environmental Protection Agency's standards for sulfur oxides. The requirements for the annual secondary and maximum 24-hour secondary concentrations are deleted from the Regulation. The revisions to regulation A include the addition of several definitions. Regulation S is not approved because the regulation allows the Bunker Hill Co. to apply for permission to use a supplementary control system without the application of reasonable available control technology.

54636 **APTIC NO. 78855**

Snyder, Daniel J.

STATE OF MARYLAND. IMPLEMENTATION PLAN. PROPOSED REVISION. *Federal Register, 40(84):18796, April 30, 1975.*

A proposed revision to the Implementation Plan of the State of Maryland is announced. The proposal consists of a request to grant an exception to the Bethlehem Steel Plant at Sparrows Point from Maryland's process weight regulation and testing procedures program to allow construction of a new sintering plant at the facility. The plant is a replacement of an existing operation which the company is unable to bring into compliance. The plant would substantially reduce emissions at the operation. The control device will produce minimum hydrocarbon and sulfur trioxide emissions as well as provide the necessary particulate emission reduction determined necessary to meet standards. Public comment is invited.

54637 **APTIC NO. 78946**

Strelow, Roger

INDIANA IMPLEMENTATION PLAN. PROPOSED REVISION. *Federal Register, 40(39):8225, Feb. 26, 1975.*

A revision to the state implementation for Indiana is announced. The revision specifically excluded effluent or emission data from those records which will be considered, treated, or protected as confidential by the technical secretary of the Indiana Air Pollution Control Board. Public comment is invited.

54638 **APTIC NO. 78407**

Train, Russell E.

PART 2-PUBLIC INFORMATION. *Federal Register, 40(45):10460-10464, March 6, 1975.*

Interim regulations are promulgated which amend Chapter I of Title 40 of the Code of Federal Regulations by revising Part 2 to comply with the requirements of the recent amendments. These regulations establish procedures to be followed by the public in making requests for records and the environmental Protection Agency in handling those requests. The regulations establish a new subpart A containing the general rules and procedures applicable to all requests for records. Subpart B proposes special rules and procedures for the handling of requests for information pertaining to businesses which may be entitled to confidential treatment for reasons of trade secrecy, or commercial or financial confidentiality.

54639 **APTIC NO. 78781**

Train, Russell E.

ENERGY RELATED AUTHORITY. TEMPORARY SUSPENSIONS, COMPLIANCE DATE EXTENSIONS, AND ONE YEAR POSTPONEMENTS FOR POWER PLANT SHUT DOWNS; REQUIREMENTS. *Federal Register, 40(82):18438-18445, April 28, 1975.*

Proposed changes in the temporary suspensions, compliance date extensions, and one-year postponements for power plant shutdown requirements are announced. The changes affect applicability, some difinitions, address of regulatory offices, compliance date extensions, temporary suspension, sources ordered to burn coal which are not eligible to apply for either a compliance date extension or a temporary suspension, petitions by air pollution control agencies, one-year postponement for power plant shutdown, and general requirements.

54640 **APTIC NO. 78783**

Train, Russell E.

PART 76--PREVENTION, CONTROL, AND ABATEMENT OF AIR POLLUTION FROM FEDERAL GOVERNMENT ACTIVITIES: PERFORMANCE STANDARDS AND TECHNIQUES OF MEASUREMENT. REVOCATION OF PART. *Federal Register, 40(58):13216, March 25, 1975.*

The revocation of Part 76 of Title 40, Code of Federal Regulations is announced. It prescribed performance standards and techniques for the control of air pollutants from Federal facilities. The standards prescribed in Part 76 are largely obsolete, as well as inconsistent with other standards adopted or otherwise effective under the Clean Air Act as amended in 1970. The standards are often inconsistent with the requirements of State implementation plans, which vary from State to State and often within States.

54641 **APTIC NO. 78784**

Train, Russell E.

BOSTON, MASSACHUSETTS. PROPOSED AMENDMENTS TO TRANSPORTATION CONTROL PLAN. *Federal Register, 40(41):8668-8681, Feb. 28, 1975.*

Proposed amendments to the transportation control plan for Boston, Mass. are presented. Included is a revised regulation for reduction of commuter travel which includes both students and employees. This program would be implemented in conjunction with the carpool matching program being developed by the Commonwealth of Massachusetts and the employee program offered by the Massachusetts Bay Transportation Authority. A new program is included for limiting overall hydrocarbon emissions from major users or organic compounds. The Environmental Protection Agency is publishing a proposal for encouraging bicycle use, new proposals for controlling carbon monoxide levels outside the Boston core area, and a new procedure for periodic monitoring and updating of the plan. Other features of the original plan are retained with modifications in some areas. These include the ceiling on the level of commercial parking spaces in the freeze area, limitation on on-street commuter parking, a semi-annual inspection and maintenance program, a retrofit program, and incentives for carpool and transit use.

54642 **APTIC NO. 78786**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. SHIP AND BARGE VAPOR RECOVERY. *Federal Register, 40(82):18437-18438, April 28, 1975.*

The suspension of interim compliance dates for regulations on ship and barge vapor recovery is announced. The regulations require recovery of vapors emitted during loading and unloading of gasoline and other volatile compounds from ships and barges in the Houston-Galveston Intrastate Air Quality Control region. The purpose is to reduce hydrocarbon emissions and to assist in the attainment and maintenance of the national ambient air quality standard for photochemical oxidants in that region. Interim dates for compliance are suspended, but the final compliance date of May 31, 1975 remains in effect.

54643 **APTIC NO. 78790**

Train, Russell E.

APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. NEW MEXICO REGULATION FOR SCHEDULES OF COMPLIANCE. *Federal Register, 40(45):10466, March 6, 1975.*

The approval of the New Mexico regulation for schedules of compliance is announced. New Mexico Air Quality Control Regulation 705, Schedules of Compliance, as adopted by the State of New Mexico on Sept. 24, 1973, meets the requirements of 51.15 of the Code of Federal Regulations and is hereby approved as part of the State of New Mexico Implementation Plan.

54644 **APTIC NO. 78823**

Train, Russell E.

APPROVAL AND PROMULTATION OF IMPLEMENTATION PLANS. IDAHO: APPROVAL AND DISAPPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(45):10465, March 6, 1975.*

The approval and disapproval of compliance schedules for the state of Idaho are announced. Two compliance schedules do not satisfy the requirements of 40 Code of Federal Regulations (CFR) 51.15. The compliance schedule for the Louisiana Pacific Corp. at Priest River is unenforceable because it does not expressly relate to any specific emission limitation. That portion of the compliance schedule for the Bunker Hill Co. at Kellogg which relates to particulate emissions does not meet the requirements of 40 CFR 51.15. Three compliance shcedules satisfy the requirements of 40 CFR Part 51 and are approved. Each approved revision establishes a new date by which an individual air pollution source must comply with an emission limitation specified by the Implementation Plan. Each compliance schedule contains interim dates for increments of progress.

54645 **APTIC NO. 78824**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. APPROVAL OF COMPLIANCE SCHEDULES FOR SULFUR OXIDES EMISSIONS IN NEW MEXICO. *Federal Register, 40(47):10992-10993, March 10, 1975.*

The approval of compliance schedules for sulfur oxides emissions in New Mexico is announced. The schedules affect the control of sulfur oxides emissions from the coalfired steam generating plants located in the New Mexico portion of the Four Corners Interstate Air Quality Control Region. The initial compliance schedules, all revisions, and all modifications for the Four Corners power plant have been completely reviewed and incorporated into one schedule for each Unit. The incorporated schedules meet the requirements of 40 Code of Federal Regulations 52.1626 and are approved.

54646 **APTIC NO. 78831**

Train, Russell E.

CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES. CERTIFICATION OF NEW LIGHT DUTY DIESEL-POWERED TRUCKS INTENDED FOR INITIAL SALE AT HIGH ALTITUDE--1977 MODEL YEAR. *Federal Register, 40(84):18778-18780, April 30, 1975.*

Certification procedures for light duty diesel powered trucks offered for sale in high altitude regions in the nation are promulgated. The regulations require manufacturers to certify new light duty diesel powered trucks designed for initial sale at high altitudes to comply with emission standards at those altitudes. Trucks which are not so certified may not be legally sold at high altitudes. These amendments are applicable to light duty diesel powered trucks beginning with the 1977 model year.

54647 **APTIC NO. 78853**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. ALABAMA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(47): 10988-10992, March 10, 1975.*

The approval of compliance schedules for the state of Alabama is announced. Each establishes a date by which an individual air pollution source must attain compliance with the emission limitations of the State implementation plan. Many schedules include incremental steps towards compliance with specific dates set for achieving those steps. All schedules satisfy the requirements of 40 Code of Federal Regulations Part 51 pertaining to compliance schedules and plant revisions. Their approval does not hinder the attainment and maintenance of the national ambient air quality standards.

54648 **APTIC NO. 78854**

Train, Russell E.

APPROVAL AND PROMULGATION OF STATE IMPLEMENTATION PLANS. NEVADA INDIRECT SOURCE REGULATIONS. *Federal Register, 40(59): 13306-13307, March 26, 1975.*

The approval of Nevada indirect source regulations is announced. The Nevada Air Quality Regulations and administrative procedures comply with the Federal requirements. The Nevada complex source review regulations are approved and previous disapproval is revoked.

54649 **APTIC NO. 78475**

Wright, Charles V.

IOWA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(106):23766-23767, June 2, 1975.*

Approval is proposed for several revised compliance schedules adopted by the State of Iowa and submitted to the Environmental Protection Agency. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the federally-approved State Implementation Plan. The compliance schedule revisions are listed. The compliance schedule is not enforceable under Iowa law after the date on which the associated variance expires, and variances cannot extend for more than one year. Approval of the part of the schedules that extend past the variance expiration date is conditional upon the state's renewal of the identical variance.

54650 **APTIC NO. 78857**

Wright, Charles V.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. KANSAS: APPROVAL AND DISAPPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(39):8225-8228, Feb. 26, 1975.*

The approval and disapproval of revised compliance schedules for the state of Kansas are announced. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the Federally approved State Implementation Plan. The schedules proposed to be disapproved fail to meet the requirements of 40 Code of Federal Regulations 51.15 in that the compliance schedules extent beyond the attainment date in the State Implementation Plan. One plan is disapproved as not being expeditious.

54651 **APTIC NO. 78705**

Sapporo Municipal Office

PRESENT SITUATION AND CONTROL OF ENVIRONMENTAL POLLUTION IN SAPPORO CITY. *(Sapporo-shi no kogai no genkyo to taisaku). Text in Japanese. 138p., May 1975.*

Environmental pollution and control measures in Sapporo city are reviewed. Descriptions of the environmental pollution control administration, pollution control council, budget, control project for 1975, pollution control ordinances and municipal funding system are given. Measurements of falling particulates, sulfur oxides, suspended particulates, nitrogen oxides, photochemical oxidants, and carbon monoxide for 1974 are given along with data on CO, lead, and NOx pollution due to automotive exhaust gas. Measurement methods for smoke, particulates, automotive exhaust gas, and photochemical smog, are given, and the pollution monitoring system is described. Sources, laws, standards, and control measurements relevant to noise, vibration, land subsidence, and rivers, agricultural chemicals, and quarrying are discussed.

54652 **APTIC NO. 78932**

Okinawa Prefectural Government

ENVIRONMENTAL WHITE PAPER IN 1974. *(Kankyo hakusho, showa 49 nenban). Text in Japanese. 177p., March 1975.*

The air pollution section of the environmental health department of the Okinawa prefectural office has 5 staff members as of December 1st, 1974. The responsibilities of the air pollution section included investigation of air pollution and odor conditions and enforcement of air pollution and odor regulations and handling of complaints. It also provides technical guidance and advice. The total number of complaints about pollution were 407 in 1971, 524 in 1972, and 368 in 1973, including 54 on air pollution and 96 on odor in 1971, 52 and 128 in 1972, and 56 and 118 in 1973, respectively. The 56 complaints on air pollution in 1973 included 8 against food manufacturers 9 on paper and pulp manufacturers, 10 on ceramics manufacturers and 8 on construction companies, while the 118 complaints on odors in 1973 included 46 against livestock breeders and 15 against food manufacturers. More than 10 organizations were established by the residents from April 1965 to the beginning of 1975 to protect the environment.

1974

54653 **APTIC NO. 78507**

Downing, Paul B. and William D. Watson, Jr.

THE ECONOMICS OF ENFORCING AIR POLLUTION CONTROLS. *J. Environ. Econ. Manage., vol. 1:219-236, 1974. 14 refs.*

The likely effects of alternative implementation and enforcement policies available to control agencies on the control of industrial air pollution are examined from an economic point of view. Policy alternatives studied include legal enforcement through the new source performance standards set forth by the Environmental Protection Agency and two effluent fee enforcement policies. A generalized model of the effects of implementation and enforcement policies on a given firm's control actions is developed, assuming that the firm is an expected cost minimizer. The model is then specifically applied to the case of fly ash discharge from a coal-fired power plant. The simulation of fly ash control indicates that stricter compliance tests and less stringent opacity standards can yield the same level of control as would otherwise be achieved. Most coal-fired power plants are not expected to meet the federal new source fly ash standard under most enforcement schemes currently employed by control agencies. (Author summary modified)

54654 **APTIC NO. 78609**

Lieberman, Daniel and William C. Lockett

INTRODUCTION TO MANUAL METHODS FOR ESTIMATING AIR QUALITY (STAFF REPORT). *California Air Resources Board, Sacramento, Calif., Evaluation and Planning, Dept. of Housing and Urban Development Grant CPA-CA-09-39-1032, Proj. CPA 1032.207. 52p., July 1974. 34 refs.*

NTIS: PB 237871

An introduction to manual methods for estimating air quality is presented. Topics covered include: meteorological considerations, source factors, averaging times, units for air quality estimates, statistical models such as the Proportional model and Larsen's model, and diffusion models based on Gaussian plume assumptions. Examples of the Proportional model are illustrated in relation to the California State Implementation Plan. Air pollutants considered include: photochemical oxidants, carbon monoxide, hydrocarbons, particulate matter, sulfur oxides, and nitrogen oxides.

54655 **APTIC NO. 78665**

Rajan, B. L. C.

AEROMETRIC DATA AND TIME SERIES ANALYSIS. *J. Inst. Engrs. (India) (Calcutta), vol. 55:17-21, Oct. 1974. 16 refs. (Presented at the Recent Developments in the Field of Public Health Engineering Seminar, Hyderabad, India, Oct. 21-22, 1974.)*

Atmospheric pollution in some parts of India is considerable. Draft legislation covering all types of pollutants from factories, transport vehicles, and domestic sources is described. The Council of the Organization for Economic Cooperation and Development recommends the polluter pay principle to the governments of member countries, to help pay for control. Tolerable amounts of pollution, regulated by quality and emission standards, are justified by a variety of factors, including different pollution assimilative capacities of the environment in its present state, different social objections and priorities attached to environmental protection, and different degrees of industrialization and population density. The oxides of nitrogen, sulfur, and carbon, products of industrial and vehicular pollution, are somewhat soluble in water and react in the presence of oxygen to form nitrous, nitric, sulfuric, and carbonic acids, which cause congestion of the throat and bronchi and edema of the lungs: standards must be related to human health. Several methods of air pollution measurement are described. Data analyses of measured values of atmospheric pollution are necessary so that seasonal variations, efficiencies of control programs, and forecasting of the pattern and trend of pollution can be studied. Air pollution indices can be determined and an alert system to control air pollution may be devised. (Author abstract modified)

1973

54656 **APTIC NO. 78484**

Vuksanovic, Petar

ENVIRONMENTAL POLLUTION BY INDUSTRIAL GASES CONTAINING FLUORINE. *(Zagadenje okoline industrijskim gasovima sa fluorom). Text in Serbo-Croatian. Tehnika, 28(7):1251-1256, 1973.*

The origin of the fluorine content of gases, their effect on the environment, and the levels at which they may be tolerated in the atmosphere are described. The Yugoslavian aluminum industry has been expanding rapidly and better information and legislation in this area are necessary. Available data on safe pollution levels are all from other countries and there is disagreement as to the proper limits. The USSR and Czechoslovakia allow 8 mg fluorine per cu m of air as a permissible 24-hr average. Some Western European industries are allowed up to 7 mg, while the limit in the U. S. is 5 mg. Standards for maximum concentrations at plant sites, methods of measuring emissions and environmental levels, the influence of alum hydration on hydrogen fluoride formation, and effect of pollution on plant life in industrial areas are discussed.

GENERAL

1975

APTIC NO. 78799

54657

Flemming, G.

HIGH STACKS AND THEIR INFLUENCE ON THE QUALITY OF THE AIR. *(Zum Einfluss von Hochschornsteinen auf die Luftqualitaet). Text in German. Z. ges. Hyg. Ihre Grenzgebiete (Berlin), 21(1):24-26, 1975. 7 refs.*

The beneficial and disadvantageous influences of high stacks on air pollutant concentrations at ground-level are discussed. High stacks usually have a beneficial effect on the air quality at ground-level in that they reduce the gaseous pollutant concentraions at all distances from the stack, and also reduce the surface area affected by the emission source. The plume rise is usually greater in the case of high stacks than for low ones. As the time necessary for the gaseous components to reach the surface layer of the atmosphere from the high emission sources increases with increasing stack height, these pollutants have more time to undergo chemical reactions before reaching the surface, which is particularly important in the case of sulfur dioxide. Also, the emission has a greater chance to pierce the inversion layer in the case of high stacks. High stacks have, however, usually no beneficial effect on ground-level air quality in cases where there is an inversion layer above them, at very great distances, in cases where the diffusion parameter is sharply reduced, as well as in the case of elevations near the stack. High stacks do not generally reduce the particulate matter concentrations; it is considerably easier to remove this type of pollutant from the flue gas plume than it is to remove gaseous components at the emission source.

APTIC NO. 78652

54658

Lucas, D. H.

THE EFFECT OF EMISSION HEIGHT IN VERY LARGE AREAS OF EMISSION. *Atmos. Environ., 9(6 and 7):607-622, June-July 1975. 9 refs.*

The effect of stack height on air pollution concentrations in very large areas of emission is mathematically analyzed using three city sizes, five mixing layer depths, six effective chimney heights, and two atmospheric stability regimes over distances of up to 1000 km. Emissions are assumed to be uniformly distributed within areas of emission, and normally continuous variables are represented by a number of fixed values. Although the concentration produced by an area of emission becomes independent of emission height at great distances, the maximum concentration at any distance decreases steadily with an increase in emission height. Sources with tall chimneys, even in very large areas of emission, account for only about 7% of the highest widespread concentrations. The successful application of 90% sulfur dioxide removal at these sources is estimated to reduce overall pollution by about 6% if chimney heights and flue gas temperatures are maintained and by less than 2% if the effective chimney heights are not maintained. Chimney heights required for effective SO2 control are within present day technology. (Author abstract modified)

APTIC NO. 78658

54659

Nakajima, Yasukichi, Yuji Minami, Hiroharu Hori, Katsuya Nakata, and Toshiaki Makihata

STEEL TOWER SUPPORTING TYPE SMOKESTACK. *(Hitachi Ship- (Tetto shijigata entotsu). Text in Japanese. Japan. Pat. building and Engineering Co., Ltd. (Japan)) Sho 50-22730. 7p., Aug. 1, 1975. 2 refs. (Appl. Jan. 19, 1971, 1 claim).*

Collective smoke stacks consisting of several stacks are commonly used to facilitate the atmospheric dispersion and dilution of smoke. The stacks, with inner lining of good adiabatic material, are erected with certain intervals on the foundation, and are held in position rigidly by joiners. The steel supporting tower built around the stacks is equipped with guide rails running vertically, and each joiner is attached rigidly or loosely to the supporting tower by fitting the guide rail into the groove provided on each corner of the joiners. The outer surface temperature of the stacks is maintained at approximately atmospheric temperature by the use of good adiabatic lining, so that the variation due to the thermal stress difference can be disregarded. The rigid joining of stacks has the effect of increasing the bend resistance.

APTIC NO. 78838

54660

Smith, M. E. and T. T. Frankenberg

IMPROVEMENT OF AMBIENT SULFUR DIOXIDE CONCENTRATIONS BY CONVERSION FROM LOW TO HIGH STACKS. *J. Air Pollution Control Assoc., 25(6):595-601, June 1975. 7 refs.*

The Muskingum River power plant was used to study the changes in ambient air concentrations resulting from the conversion from low to high stacks. Ground level sulfur dioxide concentrations were monitored with a network of four SO2 recorders and two wind measurement systems. The conversion from low to high stacks has accomplished marked reductions in concentrations, especially at the monitoring stations within 5 km of the sources. These reductions are in reasonable accord with theory, both in terms of the levels of concentrations observed and the meteorological conditions under which they occur. Most important, the Environmental Protection Agency standards are clearly being met in this area despite the presence of the 1440 MW power plant burning 5% sulfur fuel with no stack gas removal equipment. (Author abstract modified)

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